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No. ____

IN THE

SUPREME COURT OF THE UNITED STATES

October Term, 1983

GARLOCK, INC.,

Petitioner

v.

W. L. GORE & ASSOCIATES, INC.,

Respondent

APPENDIX TO PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

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APPENDIX A

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

W.L. GORE & ASSOCIATES, INC.	:	Appeal Nos.
	:	83-613/614
Appellant/Cross-Appellee,	:	
v.	:	
GARLOCK, INC.	:	
Appellee/Cross-Appellant,	:	

Decided: November 14, 1983

Before MARKEY, *Chief Judge*, DAVIS and MILLER, *Circuit Judges*.

MARKEY, *Chief Judge*.

Appeal from a judgment of the District Court for the Northern District of Ohio holding U.S. Patents 3,953,566 ('566) and 4,187,390 ('390) invalid. We affirm in part, reverse in part, and remand for a determination of the infringement issue.

Background

Tape of unsintered polytetrafluorethylene (PTFE) (known by the trademark TEFLON of E. I. du Pont de Nemours, Inc.) had been stretched in small increments. W. L. Gore & Associates, Inc. (Gore), assignee of the patents in suit, experienced a tape breakage problem in the operation of its "401" tape stretching machine. Dr. Robert Gore, Vice President of Gore, developed the invention disclosed and claimed in the '566 and '390 patents in the

course of his effort to solve that problem. The 401 machine was disclosed and claimed in Gore's U.S. Patent 3,664,915 ('915) and was the invention of Wilbert L. Gore, Dr. Gore's father. PTFE tape had been sold as thread seal tape, i.e., tape used to keep pipe joints from leaking. The '915 patent, the application for which was filed on October 3, 1969, makes no reference to stretch rate, at 10% per second or otherwise, or to matrix tensile strength in excess of 7,300 psi.

Dr. Gore experimented with heating and stretching of highly crystalline PTFE rods. Despite slow, careful stretching, the rods broke when stretched a relatively small amount. Conventional wisdom in the art taught that breakage could be avoided only by slowing the stretch rate or by decreasing the crystallinity. In late October, 1969, Dr. Gore discovered, contrary to that teaching, that stretching the rods as fast as possible enabled him to stretch them to more than ten times their original length with no breakage. Further, though the rod was thus greatly lengthened, its diameter remained virtually unchanged throughout its length. The rapid stretching also transformed the hard, shiny rods into rods of a soft, flexible material.

Gore developed several PTFE products by rapidly stretching highly crystalline PTFE, including: (1) porous film for filters and laminates; (2) fabric laminates of PTFE film bonded to fabric to produce a remarkable material having the contradictory properties of impermeability to liquid water and permeability to water vapor, the material being used to make "breathable" rainwear and filters; (3) porous yarn for weaving or braiding into other products, like space suits and pump packing; (4) tubes used as replacements for human arteries and veins; and (5) insulation for high performance electric cables.

On May 21, 1970, Gore filed the patent application that resulted in the patents in suit. The '566 patent has 24 claims directed to processes for stretching highly

crystalline, unsintered, PTFE. The processes, *inter alia*, include the steps of stretching PTFE at the rate above 10% per second and at a temperature between about 35°C and the crystalline melt point of PTFE. The '390 patent has 77 claims directed to various products obtained by processes of the '566 patent.

It is effectively undisputed that the present inventions filled a long sought yet unfilled need. The United States Army and the research director of a Garlock Inc. (Garlock) customer had been looking for and following up every remote lead to a waterproof/breathable material for many years.

It is undisputed that the present inventions enjoyed prompt and remarkable commercial success due to their merits and not to advertising or other extraneous causes.

It is undisputed that the inventions provide the most important synthetic material available for use in vascular surgery, hundreds of thousands of persons having received artificial arteries formed of the patented product since 1976, and that the patented products have unique properties useful in other medical procedures, in communications satellites, radar systems, and electrical applications.

It is undisputed that the major sources of PTFE, ICI and du Pont, greeted the patented product as "magical", "bewitching", "a remarkable new material", and one that "differs from other processed forms of Teflon".

It is undisputed that the patented products were met with skepticism and disbelief by at least one scientist who had worked with PTFE at du Pont for many years and who testified as an expert at trial.

It is undisputed that Garlock first produced an accused product in response to a customer's request for a substitute for the patented product, that Garlock advertised its accused product as a "new form" of PTFE and as "a versatile new material which provides new orders of performance for consumer, industrial, medical and electric applications", and that the customer describes

that accused product as "a new dimension in rainproof/breathable fabrics".

Proceedings

On Nov. 2, 1979, Gore sued Garlock for infringement of process claims 3 and 19 of the '566 patent, and sought injunctive relief, damages, and attorney fees. Garlock counterclaimed on Dec. 18, 1979, for a declaratory judgment of patent invalidity, non-infringement, fraudulent solicitation, and entitlement to attorney fees. On Feb. 7, 1980, Gore filed a second suit for infringement of product claims 14, 18, 36, 43, 67 and 77 of the '390 patent. In light of a stipulation, the district court consolidated the two suits for trial.

Gore alleged infringement of certain claims by certain products:

'566 patent claims	*'390 patent claims*	*Garlock Product*
19	14,43	film
—	36,77	laminate
19	18	yarn
—	67	braided packing
3	—	tape

At trial, Garlock addressed only claims 1, 3, 17, and 19 of the '566 patent and claims 1, 9, 12, 14, 18, 35, 36, 43, 67, and 77 of the '390 patent. See Appendix to this opinion.

The district court, in a thorough memorandum accompanying its judgment, and in respect of the '566 patent: (1) found claim 1 anticipated under 35 U.S.C. §102(a) by Gore's use of its 401 machine and use by the Budd Company (Budd) of a Cropper machine; (2) declared all claims of the patent invalid under 102(b) because the invention had been in public use and on sale more than one year before Gore's patent application, as evidenced by Budd's use of the Cropper machine; (3) held claims 1, 3, 17 and 19 invalid for obviousness under

35 U.S.C. §103, on the basis of various reference pairings: (a) Japanese patent 13560/67 (Sumitomo) with U.S. patent 3,214,503 (Markwood); (b) U.S. patent 2,776,465 (Smith) with Markwood; or (c) Gore's '915 patent with Sumitomo; and (4) held all claims invalid as indefinite under 35 U.S.C. §112.[1]

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1. 35 U.S.C. §102(a) and (b) provide:

> A person shall be entitled to a patent unless—
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or . . .

35 U.S.C. §103 provides:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

35 U.S.C. §112 provides:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.
>
> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention. A claim may be written in independent or dependent form, and if in dependent form, it shall be construed to include all the limitations of the claim incorporated by reference into the dependent claim.

In its opinion respecting the '390 patent, the district court held: (1) claims 1, 9, 12, 14, 18, 35, 36, 43, 67 and 77 invalid under §§102 and 103 in view of Sumitomo and Smith; and (2) all claims invalid as indefinite under §112.

The court found that Gore did not commit fraud before the Patent and Trademark Office (PTO), denied Garlock's request for attorney fees, and refrained from deciding the infringement issue.

Issues

Did the district court err in: (1) its holdings of invalidity under §§102(a), 102(b), 103 and 112; (2) its finding that Gore did not commit fraud on the PTO; or (3) denying attorney fees.

OPINION

This hard fought and bitterly contested case involved over two years of discovery, five weeks of trial, the testimony of 35 witnesses (19 live, 16 by deposition), and over 300 exhibits. The district court issued an exhaustive 37-page memorandum opinion reflective of a careful, conscientious approach to the determination of the many issues presented at trial.

The record on appeal consists of 2000 pages. The parties' briefs total 199 pages. In those briefs, counsel repeatedly accuse each other of numerous and serious breaches of the duty of candor owed the court. Each cites instances in which the testimony, the findings, and the record are or are said to be quoted in part and out of context. As a result, the usefulness and reliability of the briefs as means of informing the court has been greatly diminished if not destroyed, and careful, time-consuming study of all exhibits and each page of the record has been required.

Appellant cited 80 prior court opinions in its main brief. Appellee's brief totally ignores all but two of those

citations, but adds 57 more. Appellant's reply brief cites 126 prior court opinions, 34 earlier cited, 67 newly cited, and 25 of those cited by appellee. Appellee's reply brief cites 17 prior court opinions, 4 earlier cited, 7 newly cited, and 6 of the 147 cited by appellant. Accordingly, 211 prior court opinions have been evaluated in relation to the proof found in the record.

In light of the entire record and the applicable law, we are convinced that Garlock failed to carry its burden of proving all claims of the present patents invalid.

Standard of Review

Where, as here, dispositive legal error occurred in interpretation and application of the patent statute, 35 U.S.C., the parties' arguments relating to the salutory injunction of Fed. Rule Civ. P. 52(a) cannot be controlling on all issues. Though findings that "rest on an erroneous view of the law may be set aside on that basis", *Pullman-Standard* v. *Swint*, 456 U.S. 273 (1982), it is unnecessary here to set aside any probative fact found by the district court or to engage in what would be an inappropriate reweighing of the facts.

Among the legal errors extant in the record, each of which is discussed below, are (1) the invention set forth in each claim was not in each instance considered as a whole; (2) 35 U.S.C. §102(b) was applied though criteria for its application were not present; (3) the references were not assessed in their entireties; (4) an inherency theory under §§102 and 103 was inappropriately applied; (5) that which only the inventor taught was attributed to the prior art; (6) individual steps in prior art processes dealing with materials distinct from those with which the present inventions dealt were erroneously equated to steps in the claimed processes; (7) objective evidence of nonobviousness was disregarded; and (8) the function and application of §112 were misconstrued.

Because it permeated so much of the district court's analysis, we note more fully its frequent restriction of its consideration to 10% per second rate of stretching, which it called the "thrust of the invention". That approach is repeated throughout Garlock's briefs, which refer repeatedly to the "thrust of the invention", to "the inventive concept", and to the claims "shorn of their extraneous limitations". That facile focusing on the "thrust", "concept", and "shorn" claims, resulted in treating the claims at many points as though they read differently from those actually allowed and in suit.

It is true that Dr. Gore emphasized rapid stretching, for example, as well as the amount of stretch and other process limitations, during prosecution of the application for the '566 patent. Yet it is the claims that measure and define the invention. *Aro Manufacturing Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 339 (1961); *Bowser, Inc. v. U.S.*, 388 F.2d 346, 349, 156 USPQ 406, 409 (Ct. Cl. 1967).

Each claimed invention must be considered as a whole. 35 U.S.C. §103; *Schenck, A.G. v. Nortron Corp.*, ____ F.2d ____, 218 USPQ 698, 700 (Fed. Cir. 1983). In determining obviousness, there is "no legally recognizable or protected 'essential', 'gist', or 'heart' of the invention". *Aro*, 365 U.S. at 345. A court's restriction of a claimed multi-step process to one step constitutes error, whether done at the behest of a patentee relying on that restriction to establish infringement by one who employs only that one step in a process otherwise distinct, or at the behest of an accused infringer relying on that restriction to establish invalidity by showing that one step in a prior art process otherwise distinct.

(1) Invalidity

(a) '566 Patent

(i) §102(a) and The 401 Machine

It is undisputed that the district court held only claim 1 of the '566 patent to have been anticipated under

§102(a) by operation of the 401 machine in the Gore shop before Dr. Gore's invention in late October 1969. It did so on the deposition testimony of two former Gore employees, documents, and drawings of the 401 machine.

In August, 1969, Gore offered to sell to Export Tool Company (Export) tape "to be made" on the 401 machine. Tape made on the 401 machine was shipped to Export on October 24, 1969. The trial judge found the rolls on the 401 machine were, at least at some point in time before October 1969, spaced less than four feet apart and that the rate of stretch accomplished in operating that machine (admittedly operated in accord with the description of machine operation in the '915 patent) must have been greater than 10% per second. The district court credited testimony that Teflon 6-c, a highly crystalline form of Teflon, was used because it was the standard resin at the time, and that the tape was stretched at a temperature above 35°C. Thus it cannot be said that the record fails to support the district court's finding that the limitations of claim 1 were met by Gore's operation of the 401 machine before Dr. Gore's asserted "late October, 1969" date of invention. Though he was working with the operation of the 401 machine, Dr. Gore offered no proof that his invention date was before the date of shipment to Export.

Gore, seeking a review here of the evidence, points to certain inadequacies as indicating a failure to meet the required clear and convincing standard under §102(a). At the time of trial, the district court, bound by precedent then applicable, applied a preponderance of the evidence test. Gore asserts, erroneously, that the clearly erroneous standard does not therefore apply on this appeal. Gore does not, however, point to any basis on which the district court's findings must be held to have been clearly erroneous under the clear and convincing standard. We are not at liberty, of course, to substitute our own for the district court's findings underlying its conclusion that claim 1 is invalid.

Gore's operation of the 401 machine must thus be viewed as a consistent, reproducible use of Dr. Gore's invention as set forth in claim 1, and it is therefore irrelevant that those using the invention may not have appreciated the results. *General Electric Co. v. Jewel Incandescent Lamp Co.*, 326 U.S. 242, 248, 67 USPQ 155, 157-58 (1945). Were that alone enough to prevent anticipation, it would be possible to obtain a patent for an old and unchanged process. *Ansonia Brass & Copper Co. v. Electric Supply Co.*, 144 U.S. 11, 18 (1892); *see, H.K. Regar & Sons, Inc. v. Scott & Williams, Inc.*, 63 F.2d 229, 231, 17 USPQ 81, 83 (2d Cir. 1933).

The nonsecret use of a claimed process in the usual course of producing articles for commercial purposes is a public use. *Electric Storage Battery Co. v. Shimadzu*, 307 U.S. 5, 20, 41 USPQ 155, 161 (1939), and there was no evidence that any different process was used to produce the articles shipped to Export.

Thus it cannot be said that the district court erred in determining that the invention set forth in claim 1 of '566 patent was known or used by others under §102(a), as evidenced by Gore's operation of the 401 machine before Dr. Gore's asserted date of that invention.

In view of our affirmance of the judgment reached on claim 1 under 102(a), we need not discuss other asserted grounds of invalidity of claim 1. There was, however, no evidence whatever that the inventions set forth in other claims, of either the '566 or the '390 patent, were known or used by others as a result of Gore's operation of the 401 machine before late October, 1969.

(ii) §102(b) and the Cropper Machine

In 1966 John W. Cropper (Cropper) of New Zealand developed and constructed a machine for producing stretched and unstretched PTFE thread seal tape. In 1967, Cropper sent a letter to a company in Massachusetts, offering to sell his machine, describing its operation, and enclosing a photo. Nothing came of that letter.

There is no evidence and no finding that the present inventions thereby became known or used in this country.

In 1968, Cropper sold his machine to Budd, which at some point thereafter used it to produce and sell PTFE thread seal tape. The sales agreement between Cropper and Budd provided:

> *ARTICLE "E" — PROTECTION OF TRADE SECRETS Etc.*
>
> *1. BUDD* agrees that while this agreement is in force it will not reproduce any copies of the said apparatus without the express written permission of Cropper nor will it divulge to any person or persons other than its own employees or employees of its affiliated corporations any of the said known-how or any details whatsoever relating to the apparatus.
>
> 2. *BUDD* agrees to take all proper steps to ensure that its employees observe the terms of Article "E" 1 and further agrees that whenever it is proper to do so it will take legal action in a Court of competent jurisdiction to enforce any one or more of the legal or equitable remedies available to a trade secret plaintiff.

Budd told its employees the Cropper machine was confidential and required them to sign confidentiality agreements. Budd otherwise treated the Cropper machine like its other manufacturing equipment.

A former Budd employee said Budd made no effort to keep the secret. That Budd did not keep the machine hidden from employees legally bound to keep their knowledge confidential does not evidence a failure to maintain the secret. Similarly, that du Pont employees were shown the machine to see if they could help increase its speed does not itself establish a breach of the secrecy agreement. There is no evidence of when that viewing occurred. There is no evidence that a viewer of the machine could thereby learn anything of which process, among all possible processes, the machine is

being used to practice. As Cropper testified, looking at the machine in operation does not reveal whether it is stretching, and if so, at what speed. Nor does looking disclose whether the crystallinity and temperature elements of the invention set forth in the claims are involved. There is no evidence that Budd's secret use of the Cropper machine made knowledge of the claimed process accessible to the public.

The district court held all claims of the '566 patent invalid under 102(b), *supra*, note 3, because "the invention" was "in public use [and] on sale" by Budd more than one year before Gore's application for patent. Beyond a failure to consider each of the claims independently, 35 U.S.C. §282; *Altoona Publix Theatres, Inc. v. American Tri-Ergon Corp.*, 294 U.S. 477, 487 (1935), and a failure of proof that the claimed inventions as a whole were practiced by Budd before the critical May 21, 1969 date, it was error to hold that Budd's activity with the Cropper machine, as above indicated, was a "public" use of the processes claimed in the '566 patent, that activity having been secret, not public.

Assuming, arguendo, that Budd sold tape produced on the Cropper machine before October 1969, and that that tape was made by a process set forth in a claim of the '566 patent, the issue under §102(b) is whether that sale would defeat Dr. Gore's right to a patent on the process inventions set forth in the claims.

If Budd offered and sold anything, it was only tape, not whatever process was used in producing it. Neither party contends, and there was no evidence, that the public could learn the claimed process by examining the tape. If Budd and Cropper commercialized the tape, that could result in a forfeiture of a patent granted them for their process on an application filed by them more than a year later. *D.L. Auld Co. v. Chroma Graphics Corp.*, No. 83-585, slip op. at 5-6 (Fed. Cir. Aug. 15, 1983); *see Metalizing Engineering Co. v. Kenyon Bearing & Auto Parts Co.*, 153 F.2d 516, 68 USPQ 54 (2d Cir. 1946).

There is no reason or statutory basis, however, on which Budd's and Cropper's secret commercialization of a process, if established, could be held a bar to the grant of a patent to Gore on that process.

Early public disclosure is a linchpin of the patent system. As between a prior inventor who benefits from a process by selling its product but suppresses, conceals, or otherwise keeps the process from the public, and a later inventor who promptly files a patent application from which the public will gain a disclosure of the process, the law favors the latter. *See Horwath v. Lee*, 564 F.2d 948, 195 USPQ 701 (CCPA 1977). The district court therefore erred as a matter of law in applying the statute and in its determination that Budd's secret use of the Cropper machine and sale of tape rendered all process claims of the '566 patent invalid under §102(b).

(iii) §103

In considering claims 1, 3, 17, and 19 of the '566 patent, the district court recognized that analysis of the obviousness isue under §103 requires determination of the scope and content of the prior art, the differences between the prior art and the claims at issue, and the level of ordinary skill in the pertinent art. *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966).

In its consideration of the prior art, however, the district court erred in not taking into account the import of the markedly different behavior of PTFE from that of conventional thermoplastic polymers clearly established and undisputed on the record, and in thus disregarding the unpredictability and unique nature of the unsintered PTFE to which the claimed inventions relate, *In re Whiton*, 420 F.2d 1082, 164 USPQ 455 (CCPA 1970); in considering claims in less than their entireties, *Schenck, supra;* and in considering the references in less than their entireties, i.e., in disregarding disclosures in the references that diverge from and teach away from the invention at hand. *In re Kuderna*, 426 F.2d 385, 165 USPQ 575 (CCPA 1970).

Invalidity of claim 1 under §102(a) having been determined, it is unnecessary to discuss in detail the applicability of §103 to that claim. If claim 1 had not been held anticipated under §102(a) in light of operation of the 401 machine, it is clear from the discussion here that claim 1 could not properly have been held invalid under §103.

Claim 3 depends from and thus incorporates claim 1 but specifies a rate of stretch of 100% per second. Claim 17 also depends from claim 1 and specifies an amount of stretch of about twice the original length. Claim 19 depends from claim 17 but specifies an amount of stretch of about five times the original length.

U.S. patent 2,983,961 to Titterton, Volume 13 of the *Encyclopedia of Polymer Science and Technology* (1970), the Sumitomo patent, and witnesses for both parties, establish that teachings related to conventional thermoplastic polymers are inapplicable to PTFE.

Articles by Dogliotti and Yelland, *Effect of Strain Rate on the Viscoelastic Properties of High Polymeric Fibrous Materials*, 4 High Speed Testing 211 (1964) and Robinson and Graham, *Methods of Characterization of Polymeric Materials by High Speed Testing Techniques*, 5 High Speed Testing 261 (1965), teach that conventional plastics and sintered PTFE can be stretched further if stretched slowly. Dr. Gore demonstrated at trial and at oral argument before us that an attempt to stretch highly crystalline, unsintered PTFE slowly results in breakage, and that rapid stretching produces a greatly lengthened rod of soft, flexible material.

The '566 patent contains an example of stretching an article to 16 times its length. Smith and the '915 patent teach that PTFE could not be stretched beyond four times its length without heating it to above its crystalline melt temperature, a step avoided by Dr. Gore and as set forth in the claims.

Sumitomo teaches that there is a length limit to stretching unsintered PTFE, and does not suggest what

that limit might be. Markwood, U.S. patent 3,208,100 to Nash (Nash), and U.S. patent 2,823,421 to Scarlett (Scarlett) teach that *non-PTFE* thermoplastics can be stretched rapidly and to extended lengths, and *also* teach reduction, elimination, or avoidance of crystallinity before stretching.

The disclosure in the Smith and '915 patents that a PTFE article may be stretched to as much as four times its length encompasses the step of stretching to twice its length set forth in claim 17 and establishes that such step would have been obvious.

Claims 3 and 19 must be considered individually and separately. 35 U.S.C. §282. Nowhere, in any of the references, is it taught or suggested that highly crystalline, unsintered PTFE could be stretched at a rate of about 100% per second as required by asserted claim 3. Nor is it anywhere suggested that by rapid stretching a PTFE article be stretched to more than five times its original length as required by asserted claim 19. On the contrary, the art as a whole teaches the other way.

In concluding that obviousness was established by the teachings in various pairs of references, the district court lost sight of the principle that there must have been something present in those teachings to suggest to one skilled in the art that the claimed invention before the court would have been obvious. *In re Bergel*, 292 F.2d 955, 956-57, 130 USPQ 206, 208 (CCPA 1961); *In re Sponnoble*, 405 F.2d 578, 585, 160 USPQ 237, 244 (CCPA 1969).

The court's pairing of Sumitomo and Markwood disregarded, as above indicated, the undisputed evidence that the unsintered PTFE of Sumitomo does not respond to the conventional plastics processing of Markwood and the art recognition of that fact. *Whiton, supra*, 420 F.2d at 1085, 164 USPQ at 457.

In evaluating claim 19, for example, the pairing disregarded Sumitomo's limited length of stretch teaching. In evaluating claim 3, the court recognized that

Sumitomo made no mention of rate of stretch. Looking to Markwood to supply that teaching disregarded not only the conventional plastics-unsintered PTFE distinction but also the clear divergence of Markwood's teaching that crystallinity must be reduced or avoided from the presence of "highly crystalline" in all claims of the '566 patent.

Similarly, and for many of the same reasons, the pairing of Markwood's and Smith's teachings was an inappropriate basis for concluding that the processes set forth in claims 3 and 19 would have been obvious. As above indicated, Markwood's rapid stretching of conventional plastic polypropylene with reduced crystallinity would not suggest rapid stretching of highly crystalline PTFE, in light of teachings in the art that PTFE should be stretched slowly. The Smith patent is owned by du Pont, where Dr. Gore's process invention was considered to have produced a "remarkable new material". That circumstance is not surprising, for Smith, though dealing with PTFE, says not a word about any rate of stretch.

Lastly, the pairing of Sumitomo and the '915 patent suffers from the same shortcomings. The pairing resulted from a hypothetical set forth in Garlock's post trial brief, and was based on no testimony or other evidence in the record. In respect of claim 3, neither reference mentions rate of stretch or suggests its importance. In respect of claim 19 both references point away from the claimed invention in their limited length-of-stretch teachings. The '915 patent states: "the 65 percent expanded material could be expanded a second time for an additional 65 percent expansion or a total length increase ratio of 1:2.72 [less than three times the original length]. However, great care was necessary to obtain a uniformly expanded material at these very great expansion ratios." Thus the '915 patent suggests that the amount of stretch of 500% set forth in claim 19 (more than five times the original length) is not possible.

As indicated, Sumitomo and Smith are totally silent respecting the rate of stretch, and there is simply no teaching in the art that would suggest to one of ordinary skill that Markwood's fast stretching of other thermoplastics could or should be employed in the process of treating PTFE taught by either Sumitomo or Smith. Indeed, Smith not only says nothing about rate of stretch, its preferred teaching is away from other elements of the inventions set forth in claims 3 and 19 Smith discloses that stretching should be done after the PTFE is heated above its crystalline melting point and with decreased crystallinity. Smith teaches:

> Below about 300°C it is *not possible* to draw more than about 4X [times] and while such draw ratios can be attained around 300°C and below the polymer's crystalline melting point with resultant orientation and improved properties it is preferred to use temperatures at or above the polymer's crystalline melting point. (Emphasis added).

Nash teaches that the film should be plasticized, i.e., made more viscous, before stretching. Contrary to that teaching, Dr. Gore did not reduce crystallinity before increasing the rate of stretch, but maintained the unsintered PTFE "highly crystalline" while stretching at a 100% per second rate and to more than five times, as set forth respectively in claims 3 and 19.

On the entire record and in view of all the references, each in its entirety, it is clear that a person of ordinary skill confronted with a PTFE tape breakage problem would have either slowed the rate of stretching or increased the temperature to decrease the crystallinity. Dr. Gore did neither. He proceeded contrary to the accepted wisdom of the prior art by dramatically increasing the rate and length of stretch *and* retaining crystallinity. That fact is strong evidence of nonobviousness. *United States v. Adams*, 383 U.S. 39 (1966).

Having learned the details of Dr. Gore's invention, the district court found it within the skill of the art to stretch other material rapidly (Markwood); to stretch PTFE to increase porosity (Sumitomo); and to stretch at high temperature (Smith). The result is that the claims were used as a frame, and individual, naked parts of separate prior art references were employed as a mosaic to recreate a facsimile of the claimed invention. At no point did the district court, nor does Garlock, explain why that mosaic would have been obvious to one skilled in the art in 1969, or what there was in the prior art that would have caused those skilled in the art to disregard the teachings there found against making just such a mosaic. On the contrary, the references and the uncontested testimony, as above indicated, established that PTFE is *sui generis*. It is not surprising, therefore, that, unlike the situation in *Stratoflex, Inc. v. Aeroquip Corp.*, ____ F.2d ____, 218 USPQ 871 (Fed. Cir. 1983), there was no testimony and no finding that one skilled in the art would transfer conventional thermoplastic processes to those for unsintered PTFE, or would have been able to predict what would happen if they did.

To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher.

It is difficult but necessary that the decisionmaker forget what he or she has been taught at trial about the claimed invention and cast the mind back to the time the invention was made (often as here many years), to occupy the mind of one skilled in the art who is presented only with the references, and who is normally guided by the then-accepted wisdom in the art. Had that been here done the inventions set forth in the claims 3 and 19 of the '566 patent could only have been held non-obvious to those skilled in the art at the time those claimed inventions were made.

Error in visualizing the burden of proof on obviousness may have contributed to the court's application here of the prior art. Adopting the phrase from earlier precedents, the court said "the presumption [of validity] is weakened greatly where the Patent Office has failed to consider pertinent prior art". That is not the law of established precedent in this court. *SSIH Equipment S.A. v. ITC*, ____ F.2d ____, 218 USPQ 678, 687 (Fed. Cir. 1983); *Solder Removal Co. v. ITC*, 582 F.2d 628, 633, 199 USPQ 129, 133, n. 9 (CCPA 1978). The presumption has no separate evidentiary value. It cautions the decisionmaker against a rush to conclude invalidity. Submission of additional art that is merely "pertinent" does not dispel that caution. It is difficult to imagine a patent law suit in which an accused infringer is unable to add some new "pertinent" art. The inescapable burden of persuasion on one who would prove invalidity, however, remains through the trial. 35 U.S.C. §282.

The burden of proving invalidity may of course be facilitated by prior art that is *more pertinent* than that considered by the PTO. That did not happen here. In the present case, Sumitomo, Smith, and the '915 patent were among references considered by the PTO. Other references referred to as not considered were merely cumulative, disclosing nothing not disclosed in references that were considered by the PTO. The Canadian counterpart of Nash was considered by the PTO. The relevant disclosures of Markwood appear in Sandiford patent 3,544,671 and Paratheon patent 3,637,906, both considered by the PTO. The Russian Author's Certificate 240,997, assuming its status as prior art and whatever the material with which it dealt, contributed nothing beyond the teachings of the '915 patent considered by the PTO.

As discussed more fully below, the district court erred in specifically declining to consider the objective evidence of nonobviousness. *In re Sernaker*, 702 F.2d 989, 996, 217 USPQ 1, 7 (Fed. Cir. 1983). That evidence

can often serve as insurance against the insidious attraction of the siren hindsight when confronted with a difficult task of evaluating the prior art. Though the prior art evidence here pointed more in the direction of nonobviousness than obviousness, the objective evidence may tend, as it did in *Sernaker, supra*, to reassure the decisionmaker.

In sum, the district court erred as a matter of law on this record in concluding that Garlock had met its burden of proving that the inventions of claims 3 and 19 of the '566 patent would have been obvious.

(b) '390 patent

(i) §102

The district court found product claims 1, 9, 12, 14, 18 and 43 inherently anticipated because it found that the microstructure of nodes interconnected by fibrils is an inherent characteristic of paste-extruded PTFE products resulting from the process disclosed in Smith. The court found the first four of those claims and claim 43, plus claims 35, 36, 67 and 77 inherently anticipated because high strength PTFE products are inherent in the examples of Sumitomo.

The teachings of Smith include neither a disclosure nor a suggestion of "porous" products having a "microstructure characterized by nodes interconnected by fibrils" as required by the claims found to have been anticipated by Smith.

The teachings of Sumitomo do not include a disclosure of products having "a matrix tensile strength . . . above about 7,300 psi" as required by the claims found to have been anticipated by Sumitomo.

Anticipation requires the disclosure in a single prior art reference of each element of the claim under consideration. *Soundscriber Corp. v. U.S.*, 360 F.2d 954, 960, 148 USPQ 298, 301, *adopted*, 149 USPQ 640 (Ct. Cl. 1966). Neither Smith nor Sumitomo disclose an invention set forth in any claim of the '390 patent.

The incongruity in findings that the different processes of Smith and Sumitomo each inherently produced identical products is striking.

Garlock attempted with expert testimony to overcome the prior art shortcomings as proof of anticipation. Gore rebutted with its own expert testimony. It is unnecessary, however, to resolve apparent conflicts in the divergent testimony, much if not all of which took the form of pure unsupported assertion. No inter partes tests in which the Smith and Sumitomo processes were conducted are of record. No products of those processes were placed in evidence, and there was, of course, no analysis of any such evidentiary products.

Nor is it necessary to evaluate the inappropriate disparagement in Garlock's brief of Dr. Sperati as a "friend" of Gore.

Given the unique nature of unsintered PTFE, we are not persuaded that the "effect" of the processes disclosed in Smith and Sumitomo, an "effect" undisclosed in those patents, would be always to inherently produce or be seen always to produce products meeting all of the claim limitations. Anticipation of inventions set forth in product claims cannot be predicated on mere conjecture respecting the characteristics of products that might result from the practice of processes disclosed in references. *In re Felton*, 484 F.2d 495, 500, 179 USPQ 295, 298 (CCPA 1973). It is clear that the teachings of neither Smith nor Sumitomo place the products claimed in the '390 patent in possession of the public.

The teachings of Smith and Sumitomo are so unacceptably vague concerning characteristics of products produced by their respective processes as not to support an anticipation rejection. That fact is confirmed by the PTO's having fully considered those references and by its having issued the '390 patent over them.

Garlock's assertion that it employs a process covered by the Smith patent, if true, is irrelevant. The '390 patent was allowed over Smith as a reference. Assuming

Smith a dominating patent, the rule of law is clear that an accused infringer's employment of the process of a dominating patent does not render that employment an anticipation of an invention described and claimed in an improvement patent. As indicated, there is no present record basis for finding that the Smith process in itself necessarily and inherently results in the products, each considered in its entirety, in the claims of the '390 patent. The testimony of Garlock's expert about ex parte tests, the records of which he destroyed before trial, cannot serve as such a basis. The effusive praise of Dr. Gore's claimed products by the owner of the Smith patented process would appear, on the contrary, to confirm the action of the PTO in issuing the '390 patent.

Garlock has not met its burden of showing that claims 1, 9, 12, 14, 18, and 43 are anticipated by Smith or that claims 1, 9, 12, 14, 35, 36, 43, 67, and 77 are anticipated by Sumitomo.

(ii) §103

The scope and content of the prior art and level of ordinary skill, discussed above in relation to the '566 patent, would be the same for the '390 patent. The district court did not, however, nor does Garlock, apply the *Graham* criteria, *supra*, to the '390 claims, apparently assuming that the claimed products, having been found inherent in the processes of Sumitomo and Smith, would have been obvious in view of those references. If so, that was error. Inherency and obviousness are distinct concepts. *In re Spormann*, 363 F.2d 444, 448, 150 USPQ 449, 452 (CCPA 1966).

In discussing inherency the district court did recognize differences between Smith's disclosure and the inventions set forth in claims 1, 9, 12, 14, 18, and 43, i.e., the absence from Smith of a description of the products of Smith's process as porous and the absence from Smith of a disclosure that those products have a microstructure characterized by nodes interconnected by fibrils.

Similarly, a difference between Sumitomo's disclosure and the inventions set forth in claims 1, 9, 12, 14, 35, 36, 43, 67, and 77 was recognized in the absence from Sumitomo of a quantification of the matrix tensile strengths of the products of Sumitomo's process. The district court also discussed differences between the dependent claims and the prior art. Because we conclude that the independent claims of the '390 patent are patentable over the art of record, we need not discuss the dependent claims.

Having determined that the invention would have been obvious in view of the process of either Smith or Sumitomo, the district court did not discuss the strong showing of objective evidence of nonobviousness here present, saying with respect to one part of such evidence, "no amount of commercial success can save it." That approach was error. All evidence bearing on the issue of obviousness, as with any other issue raised in the conduct of the judicial process, must be considered and evaluated *before* the required legal conclusion is reached. *Stratoflex*, *supra*, 218 USPQ at 879.

The objective evidence of nonobviousness, i.e., the "indicia" of *Graham*, *supra*, may in a given case be entitled to more weight or less, depending on its nature and its relationship to the merits of the invention. It may be the most pertinent, probative, and revealing evidence available to aid in reaching a conclusion on the obvious/nonobvious issue. It should when present always be considered as an integral part of the analysis.

Gore's fabric laminates, for example, as set forth in claims 36 and 77, satisfied a long felt need for a material having the contradictory properties of being simultaneously breathable (allowing water vapor or perspiration to pass) and waterproof. The record establishes that such a material had long been sought by makers of rainwear and outerwear, and by the U.S. Army as well. That Gore's fabric laminates filled that need is attested by the rise in their annual dollar sales from zero to seven million in the first five years of their availability.

Gore's PTFE tubes for replacement of human arteries and veins, also satisfied a long felt need. The uncontradicted evidence establishes that Gore's PTFE tubes hold blood without leaking, need not be pre-clotted with the patient's blood, are chemically inert, and, being breathable, are less likely to cause an air embolism. The value and uniqueness of those four properties make Gore's PTFE tubes, as described in unchallenged testimony, "the most important synthetic material presently existing" in vascular surgery, and, along with other evidence in the record, reflect the intended working of the patent system.

As discussed above, current annual sales of over sixty million dollars are attributable to the merits of the products claimed in the '390 patent. Considering the long felt need for those products and the obvious commercial advantage to be gained by meeting that need, it is reasonable to conclude that the claimed products of the '390 patent would not have been obvious to persons of ordinary skill in the art at the time the claimed inventions were made.

As above indicated, the praise which greeted the products claimed in the '390 patent from PTFE suppliers, including the owner of the Smith patent, is further objective evidence of nonobviousness.

Garlock's appeal argument that the '390 claims are invalid because the recited minimum matrix tensile strengths are not "critical" is without merit. A claim to a new product is not legally required to include critical limitations. *In re Miller*, 441 F.2d 689, 696, 169 USPQ 597, 602 (CPA 1971). The '390 claims are not drawn to optimization of ingredients or ranges within broad prior art teachings, but to new porous PTFE products of particular characteristics.

In sum, and in view of the difficulty of working with unsintered PTFE and its unpredictable response to various processing techniques, the vagueness of Smith and Sumitomo concerning the products produced by those

processes, the filling of at least two long felt needs and the commercial success described above, we conclude that the inventions set forth in claims 1, 9, 12, 14, 18, 35, 36, 43, 67, and 77 of the '390 patent would not have been obvious to those skilled in the art at the time those inventions were made.

(c) §112 and the '566 and '390 patents

The patents in suit resulted from a single application and thus have substantially identical specifications. The holding of invalidity on the basis of §112 is common to both patents.

The district court found that the patents did not disclose sufficient information to enable a person of ordinary skill in the art to make and use the invention, as required by §112, first paragraph, and that certain claim language was indefinite, presumably in light of §112, second paragraph, because: (1) there was no definition in the specification of "stretch rate", different formulae for computing stretch rate having been developed and presented at trial; (2) there was no way taught in the specification to calculate the minimum rate of stretch above 35°C; (3) the phrase "matrix tensile strength" is indefinite; and (4) the phrase "specific gravity of the solid polymer" is indefinite.

The findings rest on a misinterpretation of §112, its function and purpose. The district court considered whether certain terms would have been enabling to the public and looked to formula developments and publications occurring well after Dr. Gore's filing date in reaching its conclusions under §112. Patents, however, are written to enable those skilled in the art to practice the invention, not the public, *In re Storrs*, 245 F.2d 474, 478, 114 USPQ 293, 296-97 (CCPA 1957), and §112 speaks as of the application filing date, not as of the time of trial. *In re Mott*, 539 F.2d 1291, 1296, 190 USPQ 536, 541 (CCPA 1976). There was no evidence and no finding that those skilled in the art would have found the specification non-enabling or the claim language indefi-

nite on May 21, 1970, when the application which resulted in issuance of Dr. Gore's patents was filed. Indeed, the expert quoted by the district court and whose testimony was primarily relied upon respecting formulae, was still in school at that time.

There is uncontradicted evidence in the record that at the time the application was filed "stretch rate" meant to those skilled in the art the percent of stretch divided by the time of stretching, and that the latter was measurable, for example, with a stopwatch. Concern for the absence from the specification of a formula for calculating stretch rate is therefore misplaced, and the post-filing date development of varying formula, including Dr. Gore's later addition of a formula in his corresponding Japanese patent, is irrelevant.

Section 112 requires that the inventor set forth the best mode of practicing the invention known to him at the time the application was filed. Calculating stretch rate at that time was accomplished by actually measuring the time required to stretch the PTFE material. That was the only mode then used by the inventor, and it worked. The record establishes that calculation by that mode would have been employed by those of ordinary skill in the art at the time the application was filed. As indicated, Dr. Gore's disclosure must be examined for §112 compliance in light of knowledge extant in the art on his application filing date.

The district court, though discussing enablement, spoke also of indefiniteness of "stretch rate", a matter having to do with §112, second paragraph, and relevant in assessment of infringement. The use of "stretching . . . at a rate exceeding about 10% per second" in the claims is not indefinite. Infringement is clearly assessable through use of a stopwatch. No witness said that could not be done. As above indicated, subsequently developed and therefore irrelevant formulae cannot be used to render non-enabling or indefinite that which was enabling and definite at the time the application was filed.

Similarly, absence from the specification of a method for calculating the minimum rate of stretch above 35°C does not render the specification non-enabling. The specification discloses that "[t]he lower limit of expansion rates interact with temperature in a roughly logarithmic fashion, being much higher at higher temperatures." Calculation of minimum stretch rate above 35°C is nowhere in the claims, and it is the *claimed* invention for which enablement is required. The claims require stretching at a rate greater than 10% per second at temperatures between 35°C and the crystalline melt point of unsintered PTFE. That the minimum rate of stretch may increase with temperature does not render non-enabling Dr. Gore's specification, particularly in the absence of convincing evidence that those skilled in the art would have found it non-enabling at the time the application was filed.

The district court invalidated both patents for indefiniteness because of its view that some "trial and error" would be needed to determine the "lower limits" of stretch rate above 10% per second at various temperatures above 35°C. That was error. Assuming some experimentation were needed, a patent is not invalid because of a need for experimentation. *Minerals Separation, Ltd. v. Hyde*, 242 U.S. 261, 270-71 (1916). A patent is invalid only when those skilled in the art are required to engage in *undue* experimentation to practice the invention. *In re Angstadt*, 537 F.2d 498, 503-04, 190 USPQ 214, 218 (CCPA 1976). There was no evidence and the court made no finding that undue experimentation was required.

Moreover, the finding here rested on confusion of the role of the specification with that of the claims. The court found that the specification's failure to state the lower limit of stretch rate (albeit above 10% per second) at each degree of temperature above 35°C (a requirement for at least hundreds of entries in the specification) did not "distinguish processes performed above the

'lower limit' from those performed below the 'lower limit' ". The claims of the '390 patent say nothing of processes and lower limits. Distinguishing what infringes from what doesn't is the role of the claims, not of the specification. It is clear that the specification is enabling, *In re Storrs, supra*, and that the claims of both patents are precise within the requirements of the law. *In re Moore*, 439 F.2d 1232, 169 USPQ 236 (CCPA 1971).

The finding that "matrix tensile strength" is indefinite, like the other findings under §112, appears to rest on a confusion concerning the roles of the claims and the specification. While finding "matrix tensile strength" in the claims indefinite, the district court at the same time recognized that the specification itself disclosed how to compute matrix tensile strength, in stating "to compute matrix tensile strength of a porous specimen, one divides the maximum force required to break the sample by the cross sectional area of the porous sample, and then multiplies this quantity by the ratio of the specific gravity of the solid polymer divided by the specific gravity of the porous specimen." Further, the specification provided the actual matrix tensile strength in several examples. It is well settled that a patent applicant may be his own lexicographer. In light of the disclosure of its calculation in the specification, we cannot agree that "matrix tensile strength" is either indefinite or non-enabling.

Nor does absence from the specification of a definition for "specific gravity of the solid polymer", a part of the computation of matrix tensile strength, render that computation indefinite. It is undisputed that in the many examples in the application the specific gravity values used for unsintered and sintered PTFE were 2.3 and 2.2, respectively. There was no testimony that those values were not known to persons of ordinary skill in the art or could not be calculated or measured. There is simply no support for the conclusion that "specific gravity of

the solid polymer" is indefinite or that absence of its definition renders the specification non-enabling. *See In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

We conclude that Garlock has failed to prove that at the time the application was filed, the specification was not enabling or that the claims were indefinite within the meaning of §112.

(2) *Fraud*

Fraud must be shown by clear and convincing evidence. *Norton v. Curtiss*, 433 F.2d 779, 797, 167 USPQ 532, 546-47 (CCPA 1970).

> The state of mind of the one making the representations is probably the most important of the elements to be considered in determining the existence of "fraud." . . . Good faith and subjective intent, while they are to be considered, should not *necessarily* be made controlling. Under ordinary circumstances, the *fact* of misrepresentation coupled with proof that the party making it had knowledge of its falsity is enough to warrant drawing the inference that there was a fraudulent intent. Where public policy demands a complete and accurate disclosure it may suffice to show nothing more than that the misrepresentations were made in an atmosphere of gross negligence as to their truth. [emphasis in original].

Norton, 433 F.2d at 795-96; 167 USPQ at 545; *see*, Miller, *Fraud on the PTO*, 58 JPOS 271 (1976).

Garlock alleges fraud in Gore's representations that stretching PTFE tape at a rate greater than 10% per second was novel and that it produces a physical phenomenon. The district court found the evidence insufficient to establish that Gore had a specific intent to defraud the PTO. No basis exists for our overturning that finding. Accordingly, we agree with the district court that Garlock has failed to sustain its heavy burden of proving,

by clear and convincing evidence, sufficient facts from which fraudulent intent can be inferred.

Garlock points to a September 4, 1975 Gore affidavit filed in the PTO that stated:

> 2. Prior to my invention disclosed in the captioned patent application, during production of expanded PTFE products by W. L. Gore & Associates, Inc., the rate of stretching was neither measured nor controlled and to my knowledge did *not* involve stretching of unsintered PTFE at a rate exceeding about 10% per second. (emphasis in original).

No finding of the district court and no evidence of record establishes that that statement was made in reckless disregard of facts from which an intent to defraud may be inferred.

The district court's finding in 1982 that the 401 machine inherently stretched tape at some time in 1969 at a rate more than 10% per second, does not establish that Dr. Gore was aware of that fact in 1975, nor does it make untrue his statement that to his knowledge that had not been the rate of stretch employed. Nor does the district court's finding conflict with Dr. Gore's statement that the rate of stretching was neither measured nor controlled in the Gore shop before his invention of the claimed process as a whole.

Nor does the evidence of isolated statements support Garlock's contention that Dr. Gore attempted to convince the PTO that a physical phenomenon always existed in which stretching at a rate greater than 10% per second always produced a matrix tensile strength greater than 7300 psi. On the contrary, Dr. Gore set forth in his specification examples indicating that some samples broke, ruptured, or disintegrated.

(3) *Attorney's Fees*

The district court did not abuse its discretion in denying Garlock its request for attorney fees.

Infringement

Where, as here, an appellate court reverses a holding of invalidity, and remand is ordered for trial of the factual issue of infringement, an inefficient use of judicial resources results if the second judgment is appealed. The better practice would therefore be for the district court to decide both the validity and infringement issues when both are contested at the trial, enabling the conduct of a single appeal and disposition of the entire case in a single appellate opinion.

Resolution of the infringement issue at trial may also overlap with resolution of the validity issue, where, for example, the claimed invention was or was not copied by the validity challenger, or the challenger substituted the claimed invention for freely available prior art processes or products, *Eibel*, *supra*, 261 U.S. at 56, or an assertion of nonenablement may conflict with the ease with which the accused infringer may be shown to have practiced the invention as taught in the patent. *Eibel*, *supra*, 261 U.S. at 65-66.

The district court having declined to decide the infringement issue, Gore suggests that the record here is sufficient to warrant our deciding it now. With reluctance in view of the length and bitter nature of the present litigation, we decline the suggestion. In so doing, we imply nothing of our view on the issue. Nor do we intend any implication that the district court could not itself determine the infringement issue on the present record. Infringement of particular claims of two patents was asserted. None of those claims has been finally held invalid. Assuming their continued assertion, infringement must be decided with respect to each asserted claim as a separate entity. *Altoona*, *supra*, 294 U.S. at 487. Those factual determinations should be made in the first instance by the district court.

Decision

The holdings of invalidity of claim 1 of the '566 patent under §102(a) and of claim 17 of the '566 patent un-

der §103, the determination that Gore did not commit fraud on the PTO, and the denial of attorney fees, are affirmed; the holdings that all claims of the '566 patent are invalid under §102(b), that claims 3 and 19 of the '566 patent are invalid under §103, and that all claims of the '566 patent are invalid under §112, are reversed. The holdings that claims 1, 9, 12, 14, 18, 35, 36, 43, 67, and 77 of the '390 patent are invalid under §§102 and 103, and that all claims of the '390 patent are invalid under §112, are reversed. The case is remanded for determination of the infringement issue.

AFFIRMED IN PART, REVERSED IN PART, AND REMANDED

Appendix

Claims of the '566 patent discussed at trial:

1. A process for the production of a porous article of manufacture of a polymer of tetrafluoroethylene which process comprises expanding a shaped article consisting essentially of highly crystalline poly (tetrafluoroethylene) made by a paste-forming extrusion technique, after removal of lubricant, by stretching said unsintered shaped article at a rate exceeding about 10% per second and maintaining said shaped article at a temperature between about 35°C. and the crystalline melt point of said tetrafluoroethylene polymer during said stretching.

3. The process of claim 1 in which the rate of stretch is about 100% per second.

17. The process of claim 1 in which the shaped article is expanded such that its final length in the direction of expansion is greater than about twice the original length.

19. The process of claim 17 in which said final length is greater than about five times the original length.

Claims of the '390 patent discussed at trial:

1. A porous material consisting essentially of highly crystalline polytetrafluoroethylene polymer, which material has a microstructure characterized by nodes interconnected by fibrils and has a matrix tensile strength in at least one direction above about 7,300 psi.

9. A porous material consisting essentially of polytetrafluoroethylene polymer, which material has a microstructure characterized by nodes interconnected by fibrils and has a matrix tensile strength in at least one direction above 9290 psi, which material has been heated to a temperature above the crystalline melt point of said polymer and has a crystallinity below about 95%.

12. A porous material in accordance with claim 9 which is in the form of a shaped article.

14. A product in accordance with claim 12 which is in the form of a film.

18. A product in accordance with claim 12 which is in the form of continuous filaments.

35. A laminated structure comprising (a) a first shaped article formed of a porous material made of a tetrafluoroethylene polymer, which material has a microstructure characterized by nodes interconnected by fibrils and has a matrix tensile strength in at least one direction above about 7,300 psi, and (b) a second shaped article bonded to said first shaped article.

36. The structure of claim 35 in which said first shaped article is formed of a porous material which has a matrix tensile strength in at least one direction of at least 9290 psi, and has a crystallinity below about 95%.

43. A porous material made of a tetrafluoroethylene polymer, which material has a microstructure characterized by nodes interconnected by fibrils, which material (a) has a matrix tensile strength in at least one direction above about 9290 psi, (b) has been heated to a temperature above 327° C. and has a crystallinity below about 95%, and (c) has a dielectric constant of 1.2-1.8.

67. An impregnated structure comprising

(a) A shaped article formed of a porous material made of a tetrafluoroethylene polymer which material has a microstructure characterized by nodes interconnected by fibrils and a matrix tensile strength in at least one direction above about 9290 psi, and

(b) a polymer impregnated within the pores of the said shaped article.

77. The structure of claim 35 in which the first shaped article is a sheet having pores that will pass a gas but will not pass liquid water.

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

W.L. GORE & ASSOCIATES, INC.	:	Appeal Nos.
	:	83-613/614
Appellant/Cross-Appellee,	:	
v.	:	
GARLOCK, INC.	:	
Appellee/Cross-Appellant,	:	

DAVIS, *Circuit Judge*, concurring in the result in part and dissenting in part.

I concur in the result on (1) the validity of the '390 patent under §§102-103; (2) the validity of the '390 patent under §112; (3) the invalidity of claims 1 and 17 of the '566 patent; (4) lack of fraud on the Patent and Trademark Office; and (5) denial of attorney's fees. I disagree and dissent as to the validity of claims 3 and 19 of the '566 patent.

1. The process invention embodied in claim 1 of the '566 patent was known, through use of the 401 machine in the Gore shop, well before the "invention date" (claimed by Robert Gore, the inventor) of October 1969.[1] As such, the claimed invention was invalid on at least three grounds: (i) it was anticipated and therefore would have been obvious (under 35 U.S.C. §103) at the time of the claimed invention date; (ii) the invention was "in public use" by the Gore shop (under 35 U.S.C. §102(b)) more than one year prior to the patent application (*i.e.*, prior to May 21, 1969); and (iii) the invention (made by Robert Gore) was known to and used "by others in this country" (35 U.S.C. §102(a)) before the claimed invention date of October 1969, *i.e.* the invention was used by

1. The 401 machine was used under the prior '915 patent (issued to Wilbert Gore) which contains no reference to the significance of the rate of stretch.

Wilbert Gore and others in the Gore shop before the October date.[2]

The critically important aspect of the invention of the '566 patent is the stretching of PTFE at a rate above 10% per second.[3] Robert Gore testified that he conceived this invention no earlier than October 1969 (and we have the right to take him at his word),[4] but the facts found by the District Court plainly show that the Gore shop was in fact practicing that invention considerably earlier.

The District Court found that in the 401 machine the distance between the stretch rollers controls the rate of stretch; a shorter distance results in a higher rate of stretch; for the process described in the '915 patent to be practiced with a rate of stretch *below* 10% per second, the distance between the stretch rollers would have to be greater than five feet; if the distance is less than four feet, the rate of stretch is greater than 10% per second; the machine drawings used to construct the 401 machine indicate that the distance between the stretch rollers was eight *inches;* a Gore employee testified that "I am reasonably sure that no effective [stretch] rolls in question would have been more than three feet simply because of the nature and size of the equipment" and that he did not remember any stretching more than three feet; another Gore employee testified that the distance between the rollers was "a maximum of 18 *inches*" (emphasis added); a document prepared by the same employee (an engineer) on June 10, 1969 reports that the stretch span was 8 *inches*; the 401 machine was the only stretching machine used by the Gore company; and

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2. Aside from the bases I discuss, I do not reach the other grounds asserted for invalidity of the '566 patent.

3. Before the PTO Robert Gore concededly referred to this as "critical" to his invention or as *his* "invention."

4. The District Court found that October 1969 was the earliest date Robert Gore asserts for his conception of the invention in the '566 patent.

the 401 machine was never substantially changed before October 1969. All this adds up to the fact that the 401 machine was at all relevant times operated with a stretch of less than four feet.[5] There is no question that the machine was so operated before October 1969 (the District Court found that sales of tape made by the 401 machine were proposed in August 1969).

I can accept Robert Gore's affidavit (to the PTO) that there was no stretching in the Gore shop at a rate exceeding about 10% per second prior to "*my* invention disclosed in the captioned patent application" (emphasis added)[6] only because that declaration was expressly qualified by the phrase "to *my* knowledge" (emphasis added). The District Court specifically found no specific intent by Robert Gore to defraud and, on this record, we cannot properly overturn that finding. But the absence of personal intent to defraud does not mean or say that, whether Robert Gore realized it or not, the 401 machine was not actually operating, well before October 1969, to stretch unsintered PTFE at a rate exceeding about 10% per second. *Cf. O'Brien* v. *Westinghouse Electric Corp.*, 293 F.2d 1, 10 (3rd Cir. 1961). It seems impossible to me to reconcile Robert Gore's insistence on two facts — that (i) he invented the process in Ocober 1969 and (ii) he had no knowledge prior to October 1969 of stretching PTFE at the critical rate — with the solid facts in the

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5. The Gores (Robert and Wilbert) testified at trial that the distance was five feet but there is no indication that the trial court (which did not cite this testimony but did cite the opposing evidence) credited the Gores' testimony.

6. The factor of the rate of stretching was of direct interest to the examiner during the prosecution of the '566 patent. In response to the examiner's express request for a declaration that the Gore firm's production of stretched PTFE tape, prior to Robert Gore's invention asserted here, did not involve stretching of unsintered PTFE at a rate exceeding about 10% per second, Robert Gore filed an affidavit in the PTO specifically stating that "*to my knowledge*" (emphasis added) the 401 machine did *not* involve stretching at a rate exceeding about 10% per second.

record as to the prior operation of the 401 machine, except on the view that Robert Gore did not realize that he and others in the Gore shop had made his invention previously.

2. It follows that in October 1969 the invention of '566 would have been obvious under §103 to Robert Gore because the prior practice of the 401 machine constituted prior art. Even if this was not prior art technically within §102, that statutory provision "is not the *only* source of prior art." *In re Fout*, 675 F.2d 297, 300 (CCPA 1982, emphasis in original). The 401 machine was practiced under the '915 patent (issued to Wilbert Gore) and, whether or not Robert Gore subjectively realized what was happening, he and others in the Gore shop were practicing the invention later embodied in the '566 patent. That was prior art at least to Robert Gore. *Id.* at 300-01.[7]

3. If it be thought necessary to invoke §102 directly, in order to show anticipation, the record contains proof that the 401 machine was designed, constructed and used (just as described *supra*) in November and December 1968 and the early months of 1969 — more than one year prior to the '566 patent application of May 21, 1970. *See* Jt. App. E 1199- E 1200. Section 102(b) therefore applies. Although commercial production was apparently not actively sought until June 1969, the practicing of the 401 machine prior to May 21, 1969 was "a public use" because the Gore company made "use of the device * * * in the factory in the regular course of business." *Connecticut Valley Enterprises, Inc. v. United States*, 348 F.2d 949, 952, 146 USPQ 404, 406 (Ct. C1. 1965).

4. Also, §102(a)[8] applies here because Robert Gore

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7. The District Court has found that there are no differences between claim 1 of the '566 patent and the processes previously used by the Gore firm to produce paste-extruded unsintered PTFE.

8. An invention is anticipated if it "was known or used *by others* in this country * * * * before the invention thereof by the applicant for patent" (emphasis added).

was the inventor in the '566 patent and Wilbert Gore and others in the Gore shop were using the 401 machine before October 1969. Wilbert Gore (the inventor in the '915 patent under which the 401 machine was made and used) and the other employees are "others" within §102(a) — they are not the same as Robert Gore who claimed to be inventor of the process that ripened into the '566 patent.[9] *See also* §102(f), which would bar Robert Gore if he did not himself invent the subject matter of the '566 patent.[10]

5. The majority sustains the validity of claims 3 and 19 of the '566 patent (the claims also involved in appellant's suit for infringement) which are dependent on invalid claim 1. Because of the invalidity of claim 1 the only possible novelty in claim 3 would be the requirement that the rate of stretch would be about 100% per second, and the possible novelty of claim 19 would be that the final length would be greater than about five times the original length. My position is that both of these added elements, if novel, would have been obvious to persons of ordinary skill in the art.

The defect in the majority's analysis is that it neglects the cardinal fact that the prior art included the 401 machine (discussed *supra*), not merely the earlier patents assessed in the majority opinion. The 401 machine directly involved PTFE itself, not conventional thermoplastic polymers. That machine also directly involved rapid stretching of PTFE at a rate markedly exceeding 10%. With this prior art of the 401 machine before him, an ordinary person skilled in the art would maximize stretch rate, if only to improve the machine's production

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9. It is undisputed that it was Wilbert Gore who initiated the project for the 401 machine and watched over it.

10. The majority's discussion of "secondary considerations," though it is relevant to other aspects of this case, is irrelevant to the issue of anticipation raised by the 401 machine, and hardly persuasive as to the issues of obviousness based on or with respect to the 401 machine.

rate. Cf. *In re Dwyer, Jewell, Johnson, McGrath, & Rubin*, 317 F.2d 203, 207, 137 USPQ 540 (CCPA 1963). Moreover, the very existence and operation of the 401 machine, which stretched PTFE rapidly without breaking, suggests to the skilled person the probability of stretching at even higher rates. Certainly, in the light of the 401 machine, skilled workers would see in at least the prior Markwood, Nash, and Scarlett patents (teaching extensive and rapid stretching of non-PTFE thermoplastics) the suggestion that the method of the 401 machine could also be used for comparable rapid and extensive stretching of PTFE.

6. In sum, I cannot escape the conclusion that — although there was no fraud proved — if the true facts as to the 401 machine had been made known to the PTO (as it requested), the involved claims of the '566 patent should (and probably would) not have been accepted.

APPENDIX B

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

February 6, 1984

ERRATUM

Appeal Nos. 83-613/83-614

W.L. GORE & ASSOCIATES, INC.,

v.

GARLOCK, INC.

Decided November 14, 1983

Please make the following corrections:

Page 8, last line [A-7, line 16]: delete "Though" and capitalize — Findings —.

Page 9, line 2 [A-7, line 18]: Change the second comma to —. Thus —.

Page 9, line 3 [A-7, line 20]: After "court" insert — on the basis of its being clearly erroneous, —.

APPENDIX C

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

W.L. GORE & ASSOCIATES, INC.,	:	
	:	
Appellant/Cross-Appellee	:	
	:	
v.	:	No. 83-613/614
	:	
GARLOCK, INC.,	:	
Appellee/Cross-Appellant	:	

ORDER

A petition for rehearing and a suggestion for rehearing in banc having been filed in this case,

UPON CONSIDERATION THEREOF, it is Ordered by the court that the petition for rehearing be, and the same is hereby, Granted, only to the extent of modifying a sentence in the opinion, pursuant to the erratum dated February 6, 1984.

The suggestion for rehearing in banc is declined.

FOR THE COURT:

George E. Hutchinson, *Clerk*

February 21, 1984

cc: David H. Pfeffer
John J. Mackiewicz

APPENDIX D

SUPREME COURT OF THE UNITED STATES

No. A-878, October Term, 1983

GARLOCK, INC.,

Petitioner,

v.

W. L. GORE & ASSOCIATES

ORDER EXTENDING TIME TO FILE PETITION FOR WRIT OF CERTIORARI

UPON CONSIDERATION of the application of counsel for petitioner,

IT IS ORDERED that the time for filing a petition for writ of certiorari in the above-entitled cause be, and the same is hereby, extended to and including July 5, 1984.

/s/ WARREN E. BURGER
Chief Justice of the United States.

Dated this 4th day of May, 1984

APPENDIX E

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF OHIO
EASTERN DIVISION

W. L. GORE & ASSOCIATES, INC.,	:	
	:	
Plaintiff,	:	
	:	
v.	:	Case Nos.
	:	C79-2074
	:	and C80-174
	:	Judge
	:	John M. Manos
	:	
GARLOCK, INC.,	:	
	:	
Defendant.	:	

ORDER

Pursuant to the Memorandum of Opinion issued in the above-captioned case this date, the court holds United States Letters Patent Nos. 3,953,566 and 4,187,390 invalid under 35 U.S.C. §§102, 103 and 112 and enters judgment for the defendant.

IT IS SO ORDERED.

John M. Manos

United States District Judge

MEMORANDUM OF OPINION

On November 2, 1979 plaintiff, W. L. Gore & Associates, Inc., (hereinafter, Gore), filed the above-captioned case seeking injunctive relief, damages, and attorney's fees due to the alleged infringement of its United States Letters Patent No. 3,953,566, (hereinafter, '566), by the defendant Garlock, Inc., (hereinafter, Garlock). On December 18, 1979 Garlock filed an answer and counterclaim seeking declaratory relief regarding the validity of Gore's patent and attorney's fees. Subsequently, on February 7, 1980 Gore filed a second action against Garlock alleging that Garlock's conduct in the first cause of action also constituted infringement of Gore's United States Letters Patent No. 4,187,390, (hereinafter, '390). On February 28, 1980 the parties stipulated that the two actions should be consolidated for trial. Jurisdiction is invoked pursuant to 28 U.S.C. §1338 and 35 U.S.C. §281.[1]

A trial to the court began on June 23, 1982. At the close of all the evidence the court took the action under advisement and the parties submitted post-trial briefs. Upon consideration of the testimony of witnesses at trial, the exhibits received, the facts to which the parties stipulated and their briefs, the court finds Gore's patents invalid because the inventions claimed: (1) lack novelty under 35 U.S.C.§102;[2] (2) are obvious under 35 U.S.C.

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1. 28 U.S.C. §1338(a) provides:

1. The district courts shall have original jurisdiction of any civil action arising under any Act of Congress relating to patents, plant variety protection, copyrights and trade-marks. Such jurisdiction shall be exclusive of the courts of the states in patent, plant variety protection and copyright cases.

35 U.S.C. §281 provides as follows:

A patentee shall have remedy by civil action for infringement of his patent.

2. 35 U.S.C. §102 provides as follows:

A person shall be entitled to a patent unless—

(a) the invention was known or used by others in this country, or patented or described in a printed publication in

§103;[3] and (4) are indefinite under 35 U.S.C. §112.[4] Therefore, the court enters judgment for Garlock. The

this or a foreign country, before the invention thereof by the applicant for patent, or

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or

(c) he has abandoned the invention, or

(d) the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States, or

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent, or

(f) he did not himself invent the subject matter sought to be patented, or

(g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

3. 35 U.S.C. §103 provides as follows:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. 35 U.S.C §112 provides as follows:

The specification shall contain a written description of the

court finds further that Gore did not commit fraud in obtaining the patents and therefore, the court shall not award fees under 35 U.S.C. §285.[5] The following find-

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NOTE — *(Continued)*

invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

A claim may be written in independent or, if the nature of the case admits, in dependent or multiple dependent form.

Subject to the following paragraph, a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.

A claim in multiple dependent form shall contain a reference, in the alternative only, to more than one claim previously set forth and then specify a further limitation of the subject matter claimed. A multiple dependent claim shall not serve as a basis for any other multiple dependent claim. A multiple dependent claim shall be construed to incorporate by reference all the limitations of the particular claim in relation to which it is being considered.

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

5. 35 U.S.C. §285 provides as follows:

The court in exceptional cases may award reasonable attorney fees to the prevailing party.

ings of fact and conclusions of law are filed in accordance with Fed. R. Civ. P. 52(a).[6]

Gore is a Delaware corporation with its principal place of business in Newark, Delaware. It manufactures and sells polytetrafluoroethylene, (hereinafter, PTFE), products under the trademark "GORE-TEX." Such products include: (1) fabric laminates made by bonding expanded PTFE film to one or more pieces of fabric, for use in breathable rainwear and filter bags; (2) expanded porous PTFE film manufactured for use in making laminates and certain filters; (3) expanded porous PTFE yarn for weaving or braiding into other products, including space suits for astronauts and packing for pumps; (4) expanded PTFE tubing for use as replacements for arteries and veins in the human body and (5) expanded PTFE insulation for high performance electronic cables.[7] One-half of Gore's annual sales, which exceed $120,000,000, are attributable to the two patents in suit.

Garlock is an Ohio corporation with its principal place of business in Longview, Texas. It is a wholly owned subsidiary of Colt Industries, Inc., a Pennsylva-

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6. Fed. R. Civ. P. 52(a) provides as follows:

In all actions tried upon the facts without a jury or with an advisory jury, the court shall find the facts specially and state separately its conclusions of law thereon, and judgment shall be entered pursuant to Rule 58; and in granting or refusing interlocutory injunctions the court shall similarly set forth the findings of fact and conclusions of law which constitute the grounds of its action. Requests for findings are not necessary for purposes of review. Findings of fact shall not be set aside unless clearly erroneous, and due regard shall be given to the opportunity of the trial court to judge of the credibility of the witnesses. The findings of a master, to the extent that the court adopts them, shall be considered as the findings of the court. If an opinion or memorandum of decision is filed, it will be sufficient if the findings of fact and conclusions of law appear therein. Findings of fact and conclusions of law are unnecessary on decisions of motions under Rules 12 or 56 or any other motion except as provided in Rule 41(b).

7. Plaintiff's Exhibit 8.

nia corporation with its principal place of business in New York, New York. Garlock has been engaged in the manufacture and sale of PTFE products for over twenty-five (25) years.

The '566 patent, entitled "Process for Producing Porous Products," was issued on April 24, 1976 in the name of Robert W. Gore. It contains twenty-four (24) claims. Gore alleges that Garlock infringes claims 3 and 19. Although all twenty-four (24) claims of the '566 patent are in issue because of Garlock's counterclaim for a declaratory judgment, the analysis which follows is limited to claims 3 and 19 in addition to the broader claims, 1 and 17, upon which claims 3 and 19 depend. The '390 patent, entitled "Porous Products and Process Therefor," was issued on February 5, 1980. Like the '566 patent, the '390 patent issued in the name of Robert W. Gore. It contains seventy-seven (77) claims. Gore alleges that Garlock infringes claims 14, 18, 36, 43, 67 and 77. Similar to the '566 patent, although all seventy-seven (77) claims of the '390 patent are in issue because of Garlock's counterclaim for a declaratory judgment, the analysis which follows is limited to claims 14, 18, 36, 43, 67 and 77 in addition to four (4) of the broader claims, 1, 9, 12 and 35.

Garlock's products alleged to infringe the '566 and '390 patents fall into three (3) categories: (1) film; (2) filament or yarn; and (3) tape. Garlock manufactures and sells film under the trademark "PLASTOLON." The PLASTOLON film is alleged to infringe claim 19 of the '566 patent and claims 14 and 43 of the '390 patent. In addition, a laminate manufactured with PLASTOLON film by Kenyon Piece Dyeworks, Inc., is alleged to infringe claims 36 and 77 of the '390 patent. Garlock's PTFE yarn is alleged to infringe claim 19 of the '566 patent and claim 18 of the '390 patent. Garlock's braided packing product, which is manufactured with PTFE yarn, is alleged to infringe claim 67 of the '390 patent. Finally, Garlock's PTFE threaded seal tape, which

Garlock manufactures and sells under the trademark "PLASTI-THREAD," is alleged to infringe claim 3 of the '566 patent. It is not alleged to infringe the '390 patent.

The '566 patent is directed to a process for producing porous PTFE articles by expansion. According to the patent, a shaped PTFE article is formed by a paste-forming extrusion technique. Next, the extrusion lubricant is removed by heating and the PTFE article is stretched. The stretching occurs at temperatures between 35 degrees and 327 degrees C. After the stretching is completed, the PTFE article is heated to a temperature above 327 degrees C., to "amorphously lock" it. Gore alleges that the '566 patent teaches persons skilled in the relevant art that there are six (6) variables to control when practicing the claimed invention: (1) the degree of crystallinity of the polymer, (at least 96.5% and preferably as high as possible); (2) the strength of the paste-extruded material before expansion; (3) the amount of expansion, (a greater amount of expansion results in a product that is stronger); (4) the rate of expansion, (stretching at a rate in excess of 10% per second); (5) the temperature during expansion, (between 35 degrees C., and the crystalline melt temperature); and (6) amorphous locking, (heating of the stretched PTFE product to a temperature above 327 degrees C., but below 390 degrees C., to increase strength).[8]

Regarding rate of stretch the '566 recites that there is a lower limit below which fracture (i.e. breaking) occurs or weak products are obtained. Specifically, col. 2 lines 7-28 of the '566 patent provide as follows:

> In this invention it has been found that such paste-formed, dried, unsintered shapes can be expanded by stretching them in one or more directions under certain conditions so that they become substantially much more porous and stronger. The phenomenon of expansion with increase in strength

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8. Plaintiff's Exhibit 145

> occurs with certain preferred tetrafluoroethylene resins and within preferred ranges of rate of stretching and preferred ranges of temperature. The preferred temperature range is from 35 degrees C to 327 degrees C. At the lower temperatures within this range it has been found that there is a maximum rate of expansion beyond which fracture occurs, as well as a lower limit beneath which fracture also occurs or where weak materials are obtained. The lower limit is of much more practical significance. At high temperatures within this range, only the lower limit of rate has been detected. The lower limit of expansion rates interact with temperature in a roughly logarithmic fashion, being much higher at higher temperatures. Most, but not all, of the desirable products of this invention are obtained when expansion is carried out at the higher temperatures within the range of 35 degrees C to 327 degrees C.

Thus, the '566 patent provides that the lower limit depends on the temperature at which stretching occurs and the particular PTFE resin employed. Although the '566 patent delineates this relationship, it does not provide a definition of the term rate of stretch or an equation by which to compute it. Gore asserts, however, that in all instances the required rate of stretch must be above the 10% per second referred to in claim 1.[9]

Also contained in the '566 patent are repeated references to the term "matrix tensile strength." Col. 3, lines 33-43 provide that:

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9. According to the testimony of Robert W. Gore and Gore's expert witness, Dr. Carleton A. Sperati, rate of stretch in percent per second is computed by dividing the percent stretch by the time in seconds required to obtain that amount of stretch. Gore admitted, however, that the 10% per second value referred to in claim 1 of the '566 patent finds no antecedent support in the specifications of the patent.

> . . . to compute matrix tensile strength of a porous specimen, one divides the maximum force required to break the sample by the cross sectional area of the porous sample, and then multiplies this quantity by the ratio of the *specific gravity of the solid polymer* divided by the specific gravity of the porous specimen. Equivalently, the matrix tensile strength is obtained by multiplying the tensile strength computed according to the above definition by the ratio of the *specific gravities of the solid polymer* to the porous product.

(Emphasis added). Although the terms emphasized are not defined, the '566 patent provides further that:

> [I]n the examples which follow, both tensile strength and matrix tensile strength are shown, computed according to the above method, the lowest matrix strength measured being about 7300 p.s.i. *In other words, the products shown herein all have matrix strengths of above about 7300 p.s.i.*

Col. 3, lines 43-48. (Emphasis added). Therefore, the thrust of the invention claimed in the '566 patent is that when PTFE articles are stretched at a rate that is *always* in excess of 10% per second a physical phenomenon occurs which is the production of a stretched PTFE article with a *measurable matrix tensile strength* that will be *at least* 7300 p.s.i. Claims 1, 3, 17 and 19 of the '566 patent provide as follows:

> 1. A process for the production of a porous article of manufacture of a polymer of tetrafluoroethylene which process comprises expanding a shaped article consisting essentially of highly crystalline poly(tetrafluoroethyene) made by a paste-forming extrusion technique, after removal of lubricant, by stretching said unsintered shaped article at a rate exceeding about 10% per second and maintaining said shaped article at a temperature be-

tween about 35 degrees C. and the crystalline melt point of said tetrafluoroethylene polymer during said stretching.

3. The process of claim 1 in which the rate of stretch is about 100% per second.

17. The process of claim 1 in which the shaped article is expanded such that its final length in the direction of expansion is greater than about twice the original length.

19. The process of claim 17 in which said final length is greater than about five times the original length.

The '390 patent is directed to porous PTFE products. Such products are described as possessing "outstanding combinations of high porosity and high strength." Col. 1, lines 37-38. Similar to the '566 patent, the '390 patent defines "high strength" in terms of "matrix tensile strength" and provides the same computation for determining it. Indeed, the disclosures of the two patents are nearly identical with only minor exceptions. Thirteen (13) of the sixteen (16) examples contained in the '566 patent are contained in the '390 patent. In addition the rate of stretch value of 574% per second reported in Table 5 of the '566 patent is deleted from what is otherwise the same Table 5 of the '390 patent. Claims 1, 9, 12, 14, 18, 35, 36, 43, 67 and 77 of the '390 patent provide as follows:

1. A porous material consisting essentially of highly crystalline polytetrafluoroethylene polymer, which material has a microstructure characterized by nodes interconnected by fibrils and has a matrix tensile strength in at least one direction above about 7,300 psi.

9. A porous material consisting essentially of polytetrafluoroethylene polymer, which material

has a microstructure characterized by nodes interconnected by fibrils and has a matrix tensile strength in at least one direction above 9290 psi, which material has been heated to a temperature above the crystalline melt point of said polymer and has a crystallinity below about 95%.

12. A porous material in accordance with claim 9 which is in the form of a shaped article.

14. A product in accordance with claim 12 which is in the form of a film.

18. A product in accordance with claim 12 which is in the form of continuous filaments.

35. A laminated structure comprising (a) a first shaped article formed of a porous material made of a tetrafluoroethylene polymer, which material has a microstructure characterized by nodes interconnected by fibrils and has a matrix tensile strength in at least one direction above about 7,300 psi, and (b) a second shaped article bonded to said first shaped article.

36. The structure of claim 35 in which said first shaped article is formed of a porous material which has a matrix tensile strength in at least one direction of at least 9290 psi, and has a crystallinity below about 95%.

43. A porous material made of a tetrafluoroethylene polymer, which material has a microstructure characterized by nodes interconnected by fibrils, which material (1) has a matrix tensile strength in at least one direction above about 9290 psi, (b) has been heated to a temperature above 327 degrees C. and has a crystallinity below about 95%, and (c) has a dielectric constant of 1.2-1.8.

67. An impregnated structure comprising
(a) a shaped article formed of a porous material

made of a tetrafluoroethylene polymer which material has a microstructure characterized by nodes interconnected by fibrils and a matrix tensile strength in at least one direction above about 9290 psi, and

(b) a polymer impregnated within the pores of the said shaped article.

77. The structure of claim 35 in which the first shaped article is a sheet having pores that will pass a gas but will not pass liquid water.

The grant of a patent confers on the patentee the right to exclude others from "making, using, or selling the invention" for seventeen (17) years. 35 U.S.C. §154.[10] There are three essential elements of patent validity: (1) novelty; (2) utility; and (3) nonobviousness. *United States v. Adams*, 383 U.S. 39, 86 S. Ct. 708 (1966); *Hanson v. Alpine Valley Ski Area, Inc.*, 611 F.2d 156 (6th Cir. 1979); *American Seating Co. v. National Seating Co.*, 586 F.2d 611 (6th Cir. 1978), *cert. denied*, 441 U.S. 907, 99 S. Ct. 1999 (1979); *Nicrofibers, Inc. v. Reichhold Chemicals, Inc.*, 505 F.Supp. 496 (S.D. Ohio 1980). *See*: 36 U.S.C. §§101-103. The Sixth Circuit Court of Appeals has held that "[t]he starting point in analyzing a challenge to a patent's validity is the statutory presumption that the patent is valid under 35 U.S.C. §282." *American Seating Co. v. National Seating Co., supra*, 586 F.2d at 615. *Accord: Smith v. Acme General Corp.*, 614 F.2d 1086 (6th Cir. 1980); *Hanson v. Al-*

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10. Specifically, 35 U.S.C. §154 provides as follows:

Every patent shall contain a short title of the invention and a grant to the patentee, his heirs or assigns, for the term of seventeen years, subject to the payment of fees as provided for in this title, of the right to exclude others from making, using, or selling the invention throughout the United States, referring to the specification for the particulars thereof. A copy of the specification and drawings shall be annexed to the patent and be a part thereof.

pine Valley Ski Area, Inc., supra.[11] "The presumption of validity is based upon the acknowledged experience and expertise of the Patent Office and upon the fact that the issuance of a patent constitutes a type of administrative determination supported by evidence." *Id. See also: Hanson v. Alpine Valley Ski Area, Inc., supra.* The presumption, however, has no independent evidentiary value as it serves only to allocate the burden of proof of invalidity to the party asserting it. *Universal Electric Co.*

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11. 35 U.S.C. §282 provides as follows:

A patent shall be presumed valid. Each claim of a patent (whether in independent, dependent, or multiple dependent form) shall be presumed valid independently of the validity of other claims; dependent or multiple dependent claims shall be presumed valid even though dependent upon an invalid claim. The burden of establishing invalidity of a patent or any claim thereof shall rest on the party asserting such invalidity.

The following shall be defenses in any action involving the validity or infringement of a patent and shall be pleaded:

(1) Noninfringement, absence of liability for infringement or unenforceability,

(2) Invalidity of the patent or any claim in suit on any ground specified in part II of this title as a condition for patentability,

(3) Invalidity of the patent or any claim in suit for failure to comply with any requirement of section 112 or 251 of this title,

(4) Any other fact or act made a defense by this title.

In actions involving the validity or infringement of a patent the party asserting invalidity or noninfringement shall give notice in the pleadings or otherwise in writing to the adverse party at least thirty days before the trial, of the country, number, date, and name of the patentee of any patent, the title, date, and page numbers of any publication to be relied upon as anticipation of the patent in suit or, except in actions in the United States Court of Claims, as showing the state of the art, and the name and address of any person who may be relied upon as the prior inventor or as having prior knowledge of or as having previously used or offered for sale the invention of the patent in suit. In the absence of such notice proof of the said matters may not be made at the trial except on such terms as the court requires.

v. A. O. Smith Corp., 643 F.2d 1240 (6th Cir. 1981); *Eltra Corp. v. Basic Inc.*, 599 F.2d 750 (6th Cir.), *cert. denied*, 444 U.S. 942, 100 S.Ct. 297 (1979); *Dickstein v. Seventy Corp.*, 522 F.2d 1254 (6th Cir. 1975), *cert. denied*, 423 U.S. 1055, 96 S.Ct. 787 (1970). Indeed, the Sixth Circuit Court of Appeals has held that "[i]t is firmly established that the presumption is weakened greatly where the Patent Office has failed to consider pertinent prior art." *Universal Electric Co. v. A. O. Smith Corp.*, *supra*, 643 F.2d at 1245. *Accord: Dollar Electric Co. v. Syndevco, Inc.*, 669 F.2d 1370 (6th Cir. 1982); *Smith v. Acme General Corp.*, *supra; Nicrofibers, Inc. v. Reichhold Chemicals, Inc.*, *supra; Cleveland Fabricating Co. v. Adsure, Inc.*, 298 F. Supp. 1275 (N.D. Ohio 1968). Similarly, the presumption is "*seriously weakened*" when a patent applicant fails to disclose to the patent office the results of tests which are material to the question of patentability. *Eltra Corp. v. Basic, Inc.*, *supra*, 599 F.2d at 754-55, n. 18. (Emphasis added).

Garlock asserts that Gore's patents are invalid because the inventions claimed lack novelty and/or were in public use more than one year prior to the dates the applications upon which the '566 and '390 patents issued were filed.[12] 35 U.S.C. §§102(a) and (b).[13]

With regard to patent invalidity for lack of novelty under 35 U.S.C. §102(a), the Sixth Circuit Court of Appeals has held that "[n]ovelty does not exist if a patented device is anticipated by a substantially identical device whose elements perform substantially the same work in substantially the same manner." *American Seating Co. v. National Seating Co.*, *supra*, 586 F.2d at 616. *Accord: Dunlop Co. Ltd. v. Kelsey-Hayes Co.*, 484 F.2d 407 (6th Cir. 1973), *cert. denied*, 415 U.S. 917, 94 S.Ct. 1414

12. The application upon which the '566 patent issued was filed on July 3, 1973. The application upon which the '390 patent issued was filed on June 21, 1971. Both patents, however, issued on applications which relate back to one filed on May 21, 1970.

13. *See*: F.N. 2, *supra*.

(1974); *A.J. Industries, Inc. v. Dayton Steel Foundry Co.*, 394 F.2d 357 (6th Cir. 1968). " 'Anticipation' is a term of art within patent law meaning the disclosure in the prior art of a thing substantially identical with the claimed invention." *Smith v. Acme General Corp., supra*, 614 F.2d at 1088, n. 6, citing with approval, *In re Arkley*, 455 F.2d 586 (CCPA 1972). Under 35 U.S.C. §102(b), the device must be reduced to practice or use. *Dunlop Co. Ltd. v. Kelsey-Hayes Co., supra*; *A.J. Industries, Inc. v. Dayton Steel Foundry Co., supra*. This must be a "public use," *FMC Corp. v. F.E. Myers & Bros. Co.*, 384 F.2d 4 (6th Cir. 1967), *cert. denied*, 390 U.S. 988, 88 S.Ct. 1183 (1968), and "a single public use or a mere placing of the invention on sale meets the requirements of the statute." *Dunlop Co. Ltd. v. Kelsey-Hayes Co., supra*, 484 F.2d at 413. Secret uses do not constitute prior art. *Stamicarbon v. Escambia Chemical Corp.*, 300 F. Supp. 1209 (N.D. Fla. 1969), *aff'd as modified*, 430 F.2d 920 (5th Cir.), *cert. denied*, 400 U.S. 944, 91 S.Ct. 245 (1970); *Continental Oil Co. v. Cole*, 634 F.2d 188 (5th Cir.), *cert. denied*, ____ U.S. ____, 102 S.Ct. 124 (1981); *General Tire & Rubber Co. v. Firestone Tire & Rubber Co.*, 349 F.Supp. 345 (N.D. Ohio 1972), *aff'd (rev'd) on other grounds*, 489 F.2d 1105 (6th Cir. 1973), *cert. denied*, 417 U.S. 932, 94 S.Ct. 2643 (1974). *See: FMC Corp. v. F. E. Myers & Bros. Co., supra*, in which "public use" is defined as ". . . any non-secret use of a completed and operative invention in its natural and intended way. . . ." 384 F.2d at 9. Garlock bears the burden of proof to establish its affirmative defenses by a preponderance of the evidence. *Saginaw Products Corp. v. Eastern Airlines, Inc.*, 615 F.2d 1136 (6th Cir. 1980). *See also: Dickstein v. Seventy Corp., supra*, ". . . a preponderance of evidence is sufficient to establish invalidity." 522 F.2d at 1297.

On May 23, 1972 United States Leters Patent No. 3,664,915, (hereinafter, '915), issued to Gore on an ap-

plication filed by W. L. Gore on October 3, 1969.[14] It is prior art to the '566 and '390 patents and was considered by the patent office before the patents issued. The '915 patent discloses a process for expanding PTFE thread seal tape which is manufactured by a paste-forming extrusion technique after removal of lubricant. Two affidavits executed by W. L. Gore establish that the invention of the '915 patent was reduced to practice before June 20, 1969.[15] The affidavits relate that W. L. Gore directed that an apparatus be constructed to stretch "unsintered" PTFE tape in a continuous operation.[16] Vipin Mehta, a Gore employee, was selected to design and supervise construction of such an apparatus. Copies of his drawings were used by William Antonio, a machinist, to construct and assemble various component parts. Once completed, the stretching apparatus became known as the "401 machine."

The critical components of the 401 machine are stretch rollers, the distance between which, controls the rate of stretch. A shorter distance results in a higher rate of stretch. Robert W. Gore expressly acknowledged this in the '566 patent:

> The relative positions of rolls 15 and 16 are adjustable so that the gap A between them can be varied. This allows one to control the rate of expansion. For example, when the gap distance is halved, the rate of expansion is doubled. It should be noted that the rate of expansion is also effected [sic] by the rate at which film is fed to the machine.

Col. 12, lines 11-17. For the process described in the '915 patent to be practiced at a rate of stretch below 10% per second, the distance between the stretch rollers on

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14. W. L. Gore is the father of Robert W. Gore.

15. Defendant's Exhibits 1054 and 1104.

16. The parties stipulated that "unsintered" PTFE is "PTFE that has not been heated such that it reached a temperature above the crystalline melt point." Joint Glossary of Technical Terms, p. 1.

the 401 machine would have to be greater than four (4) feet. If the distance is less than four (4) feet, the rate of stretch is greater than 10% per second. The machine drawings used to construct the 401 machine indicate that the distance between the stretch rollers was eight (8) inches. When Antonio was asked whether ". . . through the entire period that you were employed by W. L. Gore . . . from 1968 through 1972, do you have . . . any recollection of any machine in whose construction you participated in which the distance between the rollers used to effect stretching was more than two feet?," he responded:

> I can't recall specific dimensions in my mind, trying to look back at the equipment that I built. I can't see any rolls, any large rolls being at specific dimensions, whether it be two feet, three feet. But I am reasonably sure that no effective rolls in question would have been more than three feet simply because of the nature or size of the equipment.

Deposition of William Antonio, pp. 85-86. Indeed, Antonio testified further that:

> [I]f someone said that there was a stretching machine using a roll to stretch tape, and those stretching rolls were further than three feet apart, I would be shocked at my recollection because I don't remember such a thing.

Id., at pp. 91-92. James Dauerty, an engineer formerly employed by Gore, testified that the distance between the stretch rollers on the 401 machine was "a maximum of 18 inches." Deposition of James S. Dauerty, p. 24. Consistent with the machine drawings prepared and used for construction of the 401 machine, a document prepared by Douerty on June 10, 1969 reports that the "stretch span" was eight (8) inches.[17] W.L. Gore testi-

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17. Defendant's Exhibit 1123.

fied that in October, 1969, the earliest date upon which Robert W. Gore asserts that he conceived of the invention claimed in the '566 patent, the 401 machine was the only stretching machine in existence at Gore for manufacturing stretched PTFE thread seal tape. Tr., p. 1224. He testified further that, "[t]he apparatus drawing in the '915 patent details the essential elements" of the 401 machine and that the only changes in it that were made from the date on which it was assembled until October, 1969, "were minor mechanical changes and not in any way a change in the design or method of operation of the [machine]. Tr., pp. 1224-1225. Gore's response to an interrogatory in *Johnson & Johnson v. Gore*, C4389 (D. Del.), regarding when it first offered for sale any unsintered PTFE thread seal tape establishes that such sales were made before October, 1969:

> Defendant offered said product in tape form to Crane Packing Co., Morton Grove, Ill., for use in sealing threaded joints on August 8, 1969. The person acting on behalf of the defendant was John A. Crowe. The product was to be substantially 100% PTFE and was to be made according to the procedure outlined in the patent-in-suit [i.e., the 915 patent].[18]

The '915 patent contains neither a reference to the claimed significance of rate of stretch nor to unsintered PTFE products with matrix tensile strengths above 7300 p.s.i.

In 1966 John W. Cropper of Auckland, New Zealand developed and constructed a machine for stretching paste-extruded PTFE thread seal tape. The machine stretched tape between stretch rollers operated at different speeds so that a 20% amount of stretch would be imparted to the tape. The distance between the stretch rollers was four (4) inches. The tape was stretched at

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18. Defendant's Exhibit 1142, p. 14.

temperatures above 35 degrees C., after removal of the extrusion lubricant. The output speed of the machine was 4000 feet of finished tape per hour. Tr., pp. 1599-1601. Dr. Robert C. Armstrong, a professor of chemical engineering, testified that the rate of stretch for the machine was "about 61% per second." Tr., p. 1909.

On September 23, 1967 Cropper wrote to the Chesterton Company in Everett, Massachusetts.[19] The first two (2) paragraphs of that letter provide as follows:

> We have heard from Mr. Denis O'Flynn of E. I. du Pont de Nemours that he mentioned to you a machine we have developed for the manufacture of unsintered Teflon tape. He suggested you would be interested in some details of the machine, and that the opportunity existed for us to come to some arrangement to our mutual advantage.
>
> I would first like to say that any such arrangement would be welcomed by us, as we have recently been considering ways and means of extending our sales territory and our product range.

Next, the letter describes the operation of Cropper's machine and its production capacity. Finally, the letter concludes by informing:

> Should you feel therefore, that we could profitably negotiate along the general lines indicated by Denis O'Flynn we would, I am sure, very quickly come to terms.
>
> The foregoing will, no doubt, give you only some of the details which you would like. Please therefore, do not hesitate to ask for specific information and rest assured that we look forward to your reply.

A photograph of the machine was included and the letter

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19. Defendant's Exhibit 1270.

neither requested Chesterton to maintain confidentiality nor imposed on it any obligation of secrecy.

In 1968 Cropper sold a machine to produce stretched, unsintered PTFE thread seal tape to the Budd Company in Newark, New Jersey. Budd used the machine and sold stretched PTFE thread seal tape in the United States in early 1969. Tr., pp. 1738 and 1748. The sales agreement entered by Cropper and Budd provides in pertinent part as follows:

> ARTICLE "E" — PROTECTION OF TRADE SECRETS Etc.
>
> 1. BUDD agrees that while this agreement is in force it will not reproduce any copies of the said apparatus without the express written permission of Cropper nor will it divulge to any person or persons other than its own employees or employees of its affiliated corporations any of . . the said know-how or any details whatsoever relating to . the apparatus.
>
> 2. BUDD agrees to take all proper steps to ensure that . its employees observe the terms of Article "E" 1. and . . further agrees that whenever it is proper to do so it will take legal action in a Court of competent jurisdiction to enforce any one or more of the legal or equitable remedies available to a trade secret plaintiff.[20]

Although the agreement specified that the construction and operation of the machine was a trade secret of Cropper's and obligated Budd to bring suit for misappropriation should any of its employees breach that confidence, Edwin Styring, a former Budd employee familiar with the machine and the secrecy agreement under which it was sold, testified that: (1) "[t]he machine was installed as a normal piece of manufacturing equipment in [Budd's] PTFE manufacturing areas,"; (2) "[a] ny of our 500 employees in the plant could have

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20. Plaintiff's Exhibit 169, p. 3.

seen it,"; (3) "[i]n fact, we took several Du Pont people to see it so that they could help increase the speed. . .,"; and (4) the machine was not "in any way shrouded behind a curtain." Tr., pp. 1743-1744. When asked, "[w]as the machine as used at the Budd Company and the process by which the machine produced tape kept secret at the Budd Company", Styring responded: "[t]here was no effort made." *Id.*

On January 8, 1957 United States Letters Patent No. 2,776,465, (hereinafter, Smith patent), issued to Du Pont on an application filed by Jack C. Smith on August 12, 1954. The Smith patent teaches the production of shaped articles by stretching paste-extruded PTFE at temperatures between 300 degrees to 400 degrees C., after removal of the extrusion lubricant, to from two (2) to thirty-five (35) times their original length. In the file history of Gore's patents, Gore admitted that "Smith, in U.S. Patent 2,776,465, shows how to obtain a matrix tensile strength of PTFE in the range of 25,000 psi."[21] The Smith patent provides further that:

> The heating and drawing [stretching] steps may be conducted separately or simultaneously. Normally, the steps are carried out at the same time.

Col. 7, lines 36-38. When Dr. John F. Lontz, a professor of synthetic organic chemistry, was asked whether he had an opinion ". . . as to the relationship of the disclosure in the Smith patent of the simultaneous drawing and sintering operation and the process as practiced by Garlock . . . for the manufacture of stretched yarn?", he responded, ". . . it is my opinion that the simultaneous drawing and sintering that was done at [Garlock] *exactly* fits the disclosure by the Smith patent." Tr., p. 1774. (Emphasis added). Dr. Carleton A. Sperati, Gore's expert witness, testified that a PTFE product manufactured according to the process taught by the Smith patent would

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21. Plaintiff's Exhibit 3, p. 73.

have a "microstructure characterized by nodes interconnected by fibrils" as recited in claim 1 of the '390 patent. Tr., pp. 954-955.

Japanese patent 13560/67, (hereinafter, Sumitomo patent), which was published on August 1, 1967, also describes the stretching of paste-extruded PTFE. The Sumitomo patent provides in pertinent part as follows:

> This invention too has as its objective the obtaining of porous structural products which possess continuous empty holes, but it enables the production of products with a more uniform structure than has been obtained by the methods of up to now, these products being also superior in terms of strength and being even in a very thin film state, and (this invention) also presents a preparation method for more inexpensive structural products. Specifically, the porous structural products which are obtained by this invention are structural products which are obtained by the method which is characterized by the facts that an unsintered tetrafluoroethylene resin blend which contains a liquidform lubricant (singular number is assumed) is molded into sheet form, rod form, tube form, strip form, etc., by extrusion or rolling or a method which includes both, after which this is heated to above about 327 degrees C in a state stretched in at least one direction in an unsintered state; and are porous structural products which are obtained by further stretching in at least one direction this porous structural product which has been heated once to above about 327 degrees C.

Sumitomo patent, p. 3. Thus, the Sumitomo patent teaches the production of high strength PTFE products by stretching a paste-extruded PTFE article after removal of extrusion lubricant and then heating it to temperatures above 327 degrees C. The Sumitomo patent teaches further that the stretching can be performed by

a pair of stretch rollers operated at different speeds. The stretched products are described as up to 83% porous. Tr., p. 571. The Sumitomo patent notes expressly that:

> It is possible to vary these porosity values mainly by varying the stretch ratio when using a given same unsintered sheet. Again, when one wishes to obtain a structural product of high porosity, obviously one method is to increase the stretch ratio.

Sumitomo patent, p. 10. In other words, if a highly porous PTFE product is desired, the Sumitomo patent directs that it be stretched more. The Sumitomo patent attaches no specific significance to the rate of stretch and was considered by the patent office before the '566 and '390 patents issued. Indeed, while prosecuting the patent applications leading to the '566 and '390 patents, Robert W. Gore argued to the patent office that the Sumitomo patent did not teach the production of high strength PTFE products such as could be obtained when following the teachings of his invention.[22] Referring to Example 1 of the Sumitomo patent, Robert W. Gore computed the matrix tensile strength of the stretched sample having "an apparent specific gravity" of .84 and "a true specific gravity" of 2.17 to obtain a figure of 6980 p.s.i.[23] He made no effort, however, to compute the matrix tensile strengths of two additional samples contained in Example 1. The second sample was obtained by stretching a portion of the first sample "by 100% . . . at about 50°c . . ." and then heating it "at about 250°c for about 30 minutes." Sumitomo patent, p. 15. The Sumitomo patent reports that the resulting product had an "apparent specific gravity" of ".54-.56" and a porosity of "about 75% . . .." *Id.* Similarly, the third sample was obtained by stretching a portion of the first

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22. *Id.* at p. 62.
23. *Id.*

sample "by 150% . . . at about 50°c . . ." and then heating it "at about 250°c for about 30 minutes." *Id.* This product was reported to have an "apparent specific gravity" of ".37-.39" and a porosity of "about 83% . . .." *Id.* Although the stretching of PTFE was known to result in an increase in tensile strength and, therefore, the actual tensile strengths of the second and third samples reported in Example 1 were greater than the actual tensile strength of the first sample, Tr., p. 1778, Dr. Lontz assumed the tensile strengths of the second and third samples to be the same as the first sample for the purpose of computing their respective matrix tensile strengths. Tr., p. 1779. This assumption was made so that in the resulting computation the matrix tensile strengths of the second and third samples would be minimum figures. Under this assumption the matrix tensile strength of the second sample conputes to over 10,000 p.s.i., while that of the third sample computes to over 15,000 p.s.i. Tr., p. 1780.

Also contained in the Sumitomo patent are two other examples. In Example 2 the patent teaches the impregnation of other polymers into the porous structural products of Example 1. In Example 3 the patent teaches the impregnation of the samples obtained in Example 1 with different polymers and then bonding to a second shaped article. The shaped article employed in Example 3 was an iron plate. The court finds the invention claimed in the '566 patent anticipated by prior art under : (1) 35 U.S.C. §102(a) because it was "known [and] used by others in this country," as evidenced by Gore's use of the 401 machine and Budd's use of the Cropper machine; *American Seating Co. v. National Seating Co., supra; A. J. Industries, Inc. v. Dayton Steel Foundry Co., supra* and (2) 35 U.S.C. §102(b) because it was "in public use [and] on sale in this country, more than one year prior to the date of [Robert W. Gore's] application for patent in the United States," again, as evidenced by Budd's use of the Cropper machine. *Dunlop Co. Ltd. v. Kelsey-Hayes*

Co., supra; FMC Corp. v. F. E. Myers & Bros. Co., supra.[24] Therefore, the court holds the '566 patent invalid. In addition, the court finds the invention claimed in the '390 patent anticipated by prior art under 35 U.S.C. §§102(a) and (b) because: (1) the "nodes interconnected by fibrils" microstructure claimed by the patent is an inherent characteristic of paste-extruded PTFE products stretched at temperatures between 300 degrees and 400 degrees C., as taught by the Smith patent; and (2) the high strength PTFE products of claims 1, 9, 12, 14, 18, 35, 36, 43, 67 and 77 are inherent in the examples taught by the Sumitomo patent. *See: American Seating Co. v. National Seating Co., supra; FMC Corp. v. F. E. Myers & Bros. Co., supra.* Therefore, the court holds the '390 patent invalid.

In *Nickola v. Peterson*, 580 F.2d 898, 909 (6th Cir.), *cert. denied*, 440 U.S. 961, 99 S. Ct. 1504 (1979), the Sixth Circuit Court of Appeals outlined the differences between a finding of prior art under 35 U.S.C. §102 and one of obviousness under 35 U.S.C. §103:

> Confusion of the novelty requirement defined in §102 with the nonobvious subject matter requirement defined in §103 is avoided when the statutory sections are applied in proper sequence. *The starting point in appying §103 is the recognition that the claimed invention — the claimed subject matter as a whole — is novel under §102. If the claimed subject matter be old, consideration of §103 is unnecessary. The first clause of §103 states that: "A patent may not be obtained though the invention is not identically disclosed or described as set forth in*

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24. A finding of anticipation under the "public use" provision of 35 U.S.C. §102(b) is mandated because although, as Gore contends, Budd's purchase of the Cropper machine was "pursuant to a specific written injunction of secrecy," Gore's Post Trial Proposed Findings of Fact and Conclusions of Law, p. 39, ¶ 11.10.7, such agreement was neither followed by Budd nor enforced by Cropper.

> *section 102 of this title." The heart of §103 then follows, "if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains."*

(Emphasis added). Thus, if a finding of anticipation by prior art is made, consideration of obviousness is unnecessary. Assuming, however, that the '566 and '390 patents claimed novel inventions, the patents would still be invalid as obvious under 35 U.S.C. §103.

In *Graham v. John Deere Co.*, 383 U.S. 1, 17, 86 S. Ct. 684, 694 (1966), the United States Supreme Court held:

> While the ultimate question of patent validity is one of law, Great A. & P. Tea Co. v. Supermarket Equipment Corp., supra, 340 U.S. at 155, 71 S. Ct. at 131, the §103 condition, which is but one of three conditions, each of which must be satisfied, lends itself to several basic factual inquiries. Under §103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined.

Accord: General Motors Corp. v. Toyota Motor Co. Ltd., 667 F.2d 504 (6th Cir. 1981), (U.S. App. Pndg.); *Smith v. Acme General Corp., supra; Eltra Corp. v. Basic Inc., supra; Nickola v. Peterson, supra; Lucerne Products, Inc. v. Cutler-Hammer, Inc.*, 568 F.2d 784 (6th Cir. 1977). The issue is a "mixed question of both fact and law." *Kolene Corp. v. Motor City Metal Treating, Inc.*, 440 F.2d 77 (6th Cir.), *cert. denied*, 404 U.S. 886, 92 S. Ct. 203 (1971).

Robert W. Gore testified that the earliest date he conceived his invention was October, 1969. By that time, the stretching of thermoplastic polymers was "well-known in the prior art." Tr., p. 864. It was known also that the stretching of thermoplastic films, tapes and filaments resulted in significant improvements in the tensile strengths of such products. Lloyd V. MacPherson, President of the Plastics Machinery Division of the Marshall & Williams Company, (hereinafter, M & W), a manufacturer of textile finishing and thermoplastic film processing machinery, testified that "[t]he purpose of stretching is in fact to increase the physical properties of the film, primarily the tensile strength of the film, plus the tear strength and puncture strength. . . ." Tr., p. 1349. By the "middle 1960's" M & W manufactured a machine for use in stretching thermoplastic polymer films which included a pair of cylindrical rolls operated at different speeds. Tr., p. 865. The thermoplastic film to be stretched was first heated to some temperature above room temperature but below the melt point of the film to facilitate stretching and then stretched between the differential speed rolls. Tr., pp. 864-865, 1348-1349.

With regard to the Sumitomo patent, Robert W. Gore admitted at trial that: (1) it describes production of stretched PTFE "by taking a paste-extruded PTFE, unsintered material, and stretching it and then sintering it . . .", Tr. p., 190; (2) the product described at page 3 is "in general" the same as GORE-TEX film, Tr., p. 193; (3) the first operation it teaches for producing porous structural PTFE products is the same as that of Gore's patents, Tr., p. 194; (4) it describes the use of a "dispersion grade of PTFE" to produce porous structural PTFE products;[25] *id*; (5) it teaches that stretching is the most

25. Defendant's Exhibit 1035, a "Glossary of Technical Terms" filed by Gore in a proceeding before the International Trade Commission, defines the crystallinity of PTFE as follows: "For dispersion PTFE which has never been heated above the melt temperature, the polymer is 99+% crystalline."

important part of the invention, Tr., p. 197; (6) it teaches that the porosity of a PTFE product can be increased by stretching it more, Tr., p. 199; (7) it describes each method of stretching found in the '566 patent in addition to stretching between a pair of differential speed rolls, stretching above 327 degrees C., and stretching at right angles, Tr., p. 201; (8) the products produced by following its teaching would be characterized by "nodes interconnected by fibrils," Tr., p. 202; (9) it teaches that "when one wishes to obtain a structural product of high porosity, *obviously* one method is to increase the stretch ratio." (i.e., stretch it more), Tr., p. 203, (emphasis added); and (10) that while it teaches "there is a limit to the stretching of a molded product in [an] unsintered state," Sumitomo patent, p. 10, it does not provide what the limit is. Tr., p. 205.

The Sumitomo patent discloses further that:

> Unsintered tetrafluoroethylene resin has a tendency to assume a fine fibrous texture when it is subjected to shearing force, such as when it is being extruded from the die in the extrusion process or when it is being rolled with rolls or when it has been stirred vigorously. A resin which contains a liquidform lubricant turns fibrous even more easily. This conversion to a fibrous state is one of the important points when obtaining the structural products which are obtained by this invention.

Sumitomo patent, p. 10. Robert W. Gore testified that it was known in the prior art that fibrils were formed when the PTFE resin passed through the extrusion die and the calendering rolls and that the amount of fibrils present depended on the amount of shear or deformation applied. Tr., p. 178. He testified further that prior to October, 1969 he knew that the paste-extrusion process resulted in the formation of fibrils, Tr., pp. 170-171, and that if paste-extruded PTFE was stretched it would form the type of fibrils described in the '566 patent. Tr., p. 182.

Russian Author's Certificate 240,997 teaches that paste-extruded "tetrafluoroethylene–4D" articles may be "drawn [stretched] while heated to 100-300 degrees C. to 250-400% from the initial length." Russian Author's Certificate 240,997, p.2, Example 2. It teaches further that "[h]eating of up to 150°C. in drawing to 100% and up to 300°C. in drawing to 300% is recommended." *Id.* Example 1. The resulting products are described as having porosities between "50-85%." *Id.* The parties dispute whether the Russian Author's Certificate should be considered prior art to the '566 and '390 patents. It is unquestioned that it is not a patent. Therefore, it becomes a prior art reference only as of the date it becomes a printed publication. Tr., pp. 2257-2258. Page one of the Russian Author's Certificate provides that it was "[p]ublished April 1, 1969" and thereafter relates a "[p]ublication date of description [of] August 19, 1969." Both of these dates are prior to the earliest date Robert W. Gore claims he conceived the inventions of the '566 and '390 patents. The certification page from the United States Patent and Trademark Office provides that the Russian Author's Certificate was first officially translated on July 16, 1973, subsequent to the date the inventions claimed in the patents were conceived. W. L. Gore testified that he was not made aware of "this document" until December 3, 1975. Tr., p. 1081. Accordingly, Gore contends that the Russian Author's Certificate cannot be considered a prior art reference to the '566 and '390 patents. The court finds Gore's contention unpersuasive. In a brief filed in a proceeding before the International Trade Commission concerning the validity of the '915 patent Gore admitted that the publication date of Russian Author's Certificate 240,997 was August 19, 1969. Specifically, that brief provides as follows:

> Russian Author's Certificate Nos. 240,996 and 240,997, (as opposed to the abstracts) can be considered either "(foreign) Patent(s)" or a "printed publication" for the purposes of §102(a). *Under ei-*

> *ther designation, the references have effective dates of November 17, 1969 and August 19, 1969, the respective publication dates of the descriptions of the inventions.*[26]

(Emphasis added). In addition, the court finds Gore's contention, that ". . . whether 'tetrafluoroethylene-4D', or 'Ftoroplast-4D', no witness was able to establish the nature of that material, its degree of crystallinity or its availability,"[27] Gore's Post Trial Proposed Findings of Fact and Conclusions of Law, p. 28, ¶11.3.5, to be without merit. Robert W. Gore testified that the Russian Author's Certificate discloses the production of porous PTFE products and that it teaches the stretching of an unsintered paste-extruded PTFE material up to 300% at a preferred temperature of 300 degrees C. Tr., pp. 223-224. His testimony is supported by that of Dr. Sperati. Tr., p. 867. Indeed, when asked, "(i)s there any doubt in your mind that the tetrafluoroethylene-4D is the material referred to in the Russian reference, and that that is polytetrafluoroethylene?", Dr. Sperati responded, "(n)o." *Id.* Finally, Dr. Lontz testified that the material disclosed by Russian Author's Certificate 240,997 ". . . is a linear macromolecular polymer of a very high molecular rate, and highly crystalline." Tr., p. 1781. Although Robert W. Gore and W. L. Gore were aware that the Russian Author's Certificate existed, neither of them brought it to the attention of the patent examiner in connection with the prosecution of the application that issued as the '566 patent. Tr., pp. 225-226. Premised on these facts, the court finds that: (1) the experts who testified were sufficiently familiar with the material disclosed in Russian Author's Certificate 240,997; and (2) that Gore knew that it existed, so that it may be considered prior art to the '566 and '390 patents. The court so holds.

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26. Defendant's Exhibit 1223, p. 17.

27. According to Dr. Lontz, "tetrafluoroethylene-4D" should have been translated as "Floroplast-4D." Tr., pp. 2115-2116.

The '915 patent teaches the stretching of paste-extruded unsintered PTFE ribbons at temperatures between 200 degrees to 300 degrees C., after removal of extrusion lubricant. Stretching is performed between a pair of differential speed rolls and an "input or slow roll speed" of thirty (30) feet per minute is expressly disclosed. Tr., pp. 868,179. Robert W. Gore testified that the thread seal tape manufactured under the teachings of the patent had a microstructure of nodes interconnected by fibrils. Tr., p. 179. When asked, "(n)ow, is there any doubt in your mind that the stretched PTFE pipe thread sealant was indeed being made and sold by W. L. Gore & Associates prior to the time that you made your invention?", Robert W. Gore responded, "I guess not." Tr., p. 184. He testified further, however, that he never informed the patent office of such manufacture and sales.

As discussed previously, the Smith patent teaches the production of shaped articles by stretching paste-extruded PTFE at temperatures between 300 degrees to 400 degrees C., after removal of extrusion lubricant, to from two (2) to thirty-five (35) times their original length and Gore admitted that the patent ". . . shows how to obtain a matrix tensile strength of PTFE in the range of 25,000 psi."[28]

United States Letters Patent No. 3,214,503, (hereinafter, Markwood patent), issued on October 26, 1965. It teaches the production of polypropylene film of high strength by stretching it at high rates. It teaches further that:

> It has been determined that the rate of draw for the purposes of the invention must be at least about 75,000% per minute and *can be up to as high as can be tolerated without breaking of the film. The high rate of draw means that the film must be drawn*

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28. *See*: F.N. 21, *supra*.

over an unusually short span, i.e., in the order of a few inches down to a fraction of an inch.

Col. 2, lines 10-17. (Emphasis added). The Markwood patent was not cited to the patent office as a prior art reference to the '566 and '390 patents.

United States Letters Patent No. 3,208,100, (hereinafter, Nash patent), issued on September 28, 1965. It describes a machine which includes differential speed rolls for stretching plastic films longitudi .ally. It teaches that the following four (4) physical conditions are required for stretching successfully: "(1) [t]he heating of the plastic web or film to a proper degree to plastercise the film,"; "(2) [a] stretch ratio of the film must be provided,"; "(3) [a] stretch rate must be provided,"; and "(4) [t]he plastercised film must be 'set' after stretching." Col. 1, lines 35-40. It teaches further that the stretch ratio of the plastic film is provided by the difference in linear speed between the stretch rollers. Dr. Sperati testified that the stretch rate is ascertained by the linear distance between such rollers. Tr., pp. 878-879. The Nash patent was not cited to the patent office as a prior art reference to the '566 and '390 patents. It is owned by M&W. MacPherson testified that by 1968, it was known that the stretching of thermoplastic films had to be performed over short distances to be effective. Tr., pp. 1352-1360.

Finally, although Gore and Budd produced and sold paste-extruded, unsintered PTFE thread seal tape, stretched at rates above 10% per second, at temperatures above 35 degrees and below 327 degrees C., after removal of extrusion lubricant, before the '566 and '390 patents issued, their practices were not cited to the patent office as prior art references.

The court has compared the prior art analyzed above to the '566 patent and finds as follows: (1) there are no differences between claim 1 and the processes used by Gore and Budd to produce paste-extruded, unsintered PTFE thread seal tape; (2) the only differ-

ence between claims 1, 3 and 17 and the Sumitomo patent is that the Sumitomo patent does not quantify the rate of stretch or the temperature at which stretching should be conducted;[29] and (3) the only difference between claims 1, 3, 17 and 19 and the Smith patent is that the Smith patent does not quantify the rate at which PTFE should be stretched. Similarly, with regard to the '390 patent the court finds as follows: (1) the only difference between claims 1, 9, 12, 14, 18, and 43 and the Smith patent is that the Smith patent neither describes its products as porous nor characterizes them as having a microstructure of nodes interconnected by fibrils;[30] and (2) the only difference between the claims 1, 9, 12, 14, 35, 36, 43, 67 and 77 and the Sumitomo patent is that the Sumitomo patent does not quantify the matrix tensile strength of the PTFE articles that are outlined in Examples 1-3.[31]

The court finds further that the limitations which describe the articles contained in claim 12, "a shaped article," claim 14, "a film" and claim 18, "continuous filaments" fail to distinguish prior art. The Sumitomo patent describes porous films produced from stretched

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29. The Markwood patent, however, teaches that the stretching of a thermoplastic film should be conducted at rates of stretch "as high as can be tolerated without breaking of the film," and Russian Author's Certificate 240, 997 teaches that the stretching of a paste-extruded unsintered material should be conducted at temperatures between 200 degrees and 300 degrees C.

30. Gore, however, admits that: (1) the Smith patent "shows how to obtain a matrix tensile strength of PTFE in the range of 25,000 psi,"; and that (2) a PTFE product manufactured according to the process it teaches would have a microstructure of nodes interconnected by fibrils.

31. As discussed previously, however, the porous PTFE products described in the Sumitomo patent have matrix tensile strengths in excess of the 7300 and 9290 p.s.i. minimum values set forth in the '390 patent. In substance, therefore, there are no differences between the products of the '390 and Sumitomo patents.

PTFE and the Smith patent describes ". . . shaped articles such as filaments, fibers, film, foils, tapes, rods, tubes and similar structures," produced from stretched PTFE. Col. 1, lines 18-19. Similarly, the limitations contained in claims 35 and 36, ("a laminated structure," formed by bonding a stretched PTFE material to "a second shaped article"), fail to distinguish prior art because Example 3 of the Sumitomo patent teaches the same thing. In addition, claim 67, which recites "[a]n impregnated structure comprising" a shaped article of stretched PTFE with "a polymer impregnated within the pores of the said shaped article," fails to distinguish prior art because the Sumitomo patent also describes such structures. Finally, claim 43, which recites "a dielectric constant of 1.2-1.8," and claim 77, which recites a pore size, (i.e., "pores that will pass a gas but will not pass liquid water"), fail to distinguish prior art because such properties are inherent characteristics of porous stretched PTFE products produced in accordance with the Sumitomo patent. When asked, ". . . are the dielectric products of your stretched PTFE products . . . inherently characteristic of the products themselves . . . ?", Robert W. Gore responded, "[Y]es." Tr., pp. 424-425. Similarly, when asked whether ". . . the pore size is too an inherent characteristic of your product . . . ?", he responded, "[i]t varies, but it is inherent in a given product." Tr., p. 425. Robert W. Gore's testimonv is supported by that of Dr. Sperati. When asked, "[i]sn't it a fact . . . that the breathability of the film, the water resistance of the film, is . . . an inherent character of the stretched products that we are talking about?", Dr. Sperati responded, "[y]es." Tr., pp. 977-978.

In this case "the level of ordinary skill in the pertinent art," *Graham v. John Deere Co., supra*, would be possessed by an individual familiar with the stretching of thermoplastic films and fibers. The court finds that the following would be within the level of ordinary skill of such an individual as of October, 1969: (1) to stretch

an unsintered PTFE film produced by a paste-extrusion technique, after removal of extrusion lubricant, at a rate above 10% per second; (2) to produce a porous PTFE film having superior tensile strength by stretching a paste-extruded PTFE film, after removal of extrusion lubricant and heating the film in the stretched state to above the sintering temperature of the PTFE material;[32] (3) to control the porosity of stretched and sintered PTFE film by varying the stretch patio so that higher porosities could be obtained by increasing the ratios;[33] (4) to control the temperature of the film stretched, stretch ratio, stretch rate and to "set" the film after stretching;[34] (5) to use high speeds to perform stretching and draw rates as high as the film would tolerate without breaking;[35] (6) to use short draw spans when using high draw rates to stretch thermoplastic films;[36] (7) to stretch an unsintered PTFE ribbon produced by a paste-extrusion technique between a pair of stretch rollers, operated at different speeds;[37] and (8) to heat an unsintered PTFE film produced by a paste-extrusion technique while the film is expanded or stretched to produce a stretched PTFE product which has a porosity of 80%.[38]

Premised on these facts, the court holds that the inventions claimed in the '566 and '390 patents were obvious under 35 U.S.C. §103 as of October, 1969. *See: Graham v. John Deere Co., supra; General Motors Corp. v. Toyota Motor Co., Ltd., supra; Nickola v. Peterson, supra; Lucerne Products, Inc. v. Cutler-Hammer, Inc., supra.* Such a holding is mandated notwithstanding

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32. It is unquestioned that this is disclosed in the Sumitomo patent.
33. *Id.*
34. These conditions are disclosed in the Nash patent.
35. Both disclosed in the Markwood patent.
36. *Id.*
37. This is disclosed in Gore's '915 patent.
38. This is disclosed in Russian Author's Certificate 240,997.

Gore's argument of commercial success. Commercial success is but one of a number of "[s]econdary considerations . . . [that] might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented." *Graham v. John Deere Co., supra,* 383 U.S. at 17, 18, 86 S.Ct. at 694. Alone, it is not sufficient to establish that a process or product is the result of invention. *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 278-279, 96 S.Ct. 1532, 1535-1536 (1976); *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 61, 90 S.Ct. 305, 308 (1969); *Eltra Corp. v. Basic, Inc., supra.* It is unquestioned that if an alleged invention is found obvious, no amount of commercial success can save it. In this case it is equally clear that Robert W. Gore performed nothing unique when he stretched an unsintered PTFE article produced by a paste-extrusion process, after removal of extrusion lubricant, at a temperature above 35 degrees C., but below the sintering temperature of PTFE, at a rate of stretch above 10% per second. Indeed, if one was to follow Example 1 of the Sumitomo patent to produce a PTFE film stretched 250% in a lengthwise direction and the slow roll speed was thirty (30) feet per minute as described in Gore's '915 patent, the distance between the stretch rollers would have to exceed twenty-eight (28) feet for the rate of stretch to be below 10% per second. Tr., pp. 891-894. The court is persuaded by Garlock's contention that "[i]t is unconceivable that one skilled in the art of stretching thermoplastic films would use a stretch distance of twenty-eight feet in stretching a film having a thickness of the order of four mils (0.004 inch) as taught by Sumitomo." Garlock's Post Trial Brief, p. 49.

35 U.S.C. §112 provides a standard of disclosure for patent claims.[39] Under the statute an application for a patent must meet: (1) the enablement requirement, which necessitates that an applicant for a patent set

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39. *See:* F.N. 4, *supra.*

forth in the specification information sufficient to enable a person skilled in the relevant art to make and use the invention; *In re Hafner*, 410 F.2d 1403 (CCPA 1969); and (2) the best mode requirement, which necessitates that an applicant "set forth the best mode contemplated by [him] . . . of carrying out his invention." 35 U.S.C. §112. *See generally:* Chisum, *Patents* Vol. 2 §8.03 *et seq.* (1981). In *Stearn v. Superior Distributing Co.*, 674 F.2d 539, 543-544 (6th Cir. 1982), the Sixth Circuit Court of Appeals held that "[t]he objectives of 35 U.S.C. §112 . . . are that others may construct and use the invention after the expiration of the patent and that the public be informed during the life of the patent of the limits of the monopoly asserted so that the public may know which features may be safely used or manufactured without a license and which may not." (citations omitted). *See also: General Electric Co. v. Wabash Appliance Corp.*, 304 U.S. 364, 58 S.Ct. 899 (1938). "[I]n determining the questions of invention and infringement . . . [courts] need and may insist upon the precision enjoined by the statute," *United Carbon Co. v. Binney & Smith Co.*, 317 U.S. 228, 232, 63 S.Ct. 165, 168 (1942), because ". . . the claims [of the patent] measure the invention." *Continental Paper Bag Co. v. Eastern Paper Bag Co.*, 210 U.S. 405, 419, 28 S.Ct. 748, 751 (1908). *See also: General Electric Co. v. Wabash Appliance Corp., supra.* Indeed, in *United Carbon Co. v. Binney & Smith Co., supra*, 317 U.S. at 233, 63 S.Ct. at 168, the United States Supreme Court held that "[t]o sustain claims so indefinite as not to give the notice required by the statute would be in direct contravention of the public interest which Congress therein recognized and sought to protect." For the reasons which follow the court finds the '566 and '390 patents invalid for indefiniteness under 35 U.S.C. §112.

The determination of rate of stretch is critical to the validity of the '566 and '390 patents. To distinguish prior art Robert W. Gore contends that his inventions require ". . . a rate exceeding about 10% per second . . .". Claim

1 of the '566 patent. *See also:* Claim 71 of the '390 patent which provides ". . . stretching at a rate exceeding about 10% per second . . .". Neither of the patents, however, contain a definition of "stretch rate" nor an equation by which the rate of stretch "may be computed. Indeed, the court finds that: (1) the term "rate of stretch" does not have a single definition; (2) different formulas for computing "stretch rate" are known; and (3) different values result from the use of such formulas. Dr. Armstrong testified:

> Now, the first thing I would like to do is to point out that there are two general causes for ambiguity in calculating rate of stretch or rate of strain, and I will talk about both of these causes in more detail as I go through the discussion.
>
> But briefly, the two causes are first, first that there are many definitions of strain that have been used in the literature, and each one of these definitions of strain can lead to a different formula or definition for rate of strain.
>
> Secondly, if I pick a definition for rate of strain and decide on that, there is still a variety of ways that the particular formula can be applied to a specific process to calculate a definite value of rate of strain.
>
> For example, one has to specify whether he means or wants to calculate average versus instantaneous rate of stretch in the process.
>
> Secondly, for either calculated average or instantaneous rate of strain, I can compute different values depending how I hold the different processes under consideration.
>
> I can pick different velocities, different velocity distributions for a process, as I will show in a moment, and get different values; and in fact, different velocity distributions have been brought up during the testimony so far in this trial as being possible distributions.

On reading the patents we find there is nc guidance given on either of these sources of ambiguity in calculating rate of stretch.

Tr., pp. 1868-1870. (Emphasis added).[40]

In this case there are two different stretching operations involved. The first relates to stretching a PTFE tape or filament between a pair of differential speed rollers. The stretching occurs because of the difference in speed of the rollers. Thus, if the stretch roller operates at twice the speed of the feed roller, the tape stretched between the rollers will double in length. Gore characterizes this process "continuous." The parties stipulate that Garlock's PTFE tape and filaments are produced by a "continuous" process. The second process relates to stretching a PTFE web transversely to its direction of longitudinal travel. The PTFE web is moved at a constant speed and stretched laterally to make it wider rather than longer. Gore characterizes this as a "batch" process. The parties stipulate that Garlock's PTFE film is produced by a "batch" process.

The formula advanced by Gore for computing rate of stretch in a continuous process is expressed as follows:

$$R = \frac{V_2 2 - V_1 2}{2dV_1} \times 100$$

The value: R, equals the rate of stretch in percent per second; V_1, equals the peripheral speed of the slow roll; V_2, equals the peripheral speed of the fast roll; and d, equals the length of the stretch zone, defined as, the distance the film travels from the point it leaves the slow roll to the point it contacts the fast roll. Tr., pp. 389-396.

The formula for the same stretching process advanced by Gore in its Japanese patent 1,026,517 which, corresponds to and is premised on the patent applica-

40. "Rate of strain" and "rate of stretch" are synonomous. Tr., p. 1868.

tions filed in the United States upon which the '566 and '390 patents issued, is expressed as follows:

$$R = \frac{V_2 - V_1}{d} \times 100$$

The value: R, equals the rate of stretch in percent per second; V_1, equals the peripheral speed of the slow roll; V_2, equals the peripheral speed of the fast roll; and d, equals the length of the stretch zone. It is unquestioned that in any given process for stretching a thermoplastic film on a longitudinal stretching machine, a different rate of stretch will be computed when using the formula advanced by Gore in this case rather than that set forth in its Japanese patent. Considering Table 5 of the '566 patent, in which a rate of stretch of 574% per second is reported, Dr. Armstrong testified:

> Now, from the data in Table 5 I can calculate rates of strain with either Formula 1 or Formula 2.
>
> If I use Formula 1, I get a rate of strain of 374 percent per second.
>
> If I use Formula 2, due to Markwood, I get a rate of strain of 724 percent per second.
>
> *Unfortunately, when I look in Table 5, I find given a rate of strain of 574 percent per second, which is not reconcilable with either one of these values,* so I don't know which one of these formulas to pick.
>
> In fact, I don't know of any other formulas that would give a value of 574 percent per second. The probable — it is possible to construct one — I won't say it doesn't exist, but I don't know of any reasonable formulas that give that.
>
> So in the continuous process then we have *no guidance as to what formula to pick if we want to evaluate a process and see if it falls within or without the scope of the claims* of the patent.

Tr., pp. 1888-1889. (Emphasis added). Dr. Armstrong testified further that Table 5 is "[t]he *only* place in the

patent where I find sufficient data to calculate a rate of strain . . .". Tr., p. 1887. (Emphasis added). The formula for computing stretch rate that is set forth in Gore's Japanese patent is the same as that derived from definitions contained in the 1970 Annual Book of ASTM Standards.[41] Tr., pp. 928-929. When applied to Garlock's process for producing PLASTOLON film the rate of stretch computes to a value of 4.81% per second.

The rate of stretch in a "batch" process may be computed throughout the process by using the following formula:

$$R_t = \frac{V \times 100}{l_0 + Vt}$$

The value: R_t, equals the instantaneous rate of stretch in percent per second at time t; V, equals the speed at the pull; l_0, equals the initial length or width to be stretched; and t, equals the total time of stretch. As computed by the formula, the rate of stretch decreases from a maximum at the beginning of the process to a minimum at the end. Tr., p. 378. It is possible, however, to compute an average rate of stretch for a "batch" process. A formula to perform such a computation was developed by Shanti Mehta, a Gore employee, in 1972.[42] When computed according to Mehta's formula the average rate of stretch of Garlock's "batch" process is 4.81% per second. Tr., pp. 900-901 and 1894. When computed according to the formula advanced by Gore in this case, however, the average rate of stretch of Garlock's "batch" process is 20.81% per second. That formula is as follows:

$$R = \frac{L_2 - L_1 \times (100)}{L_1 \times t}$$

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41. ASTM stands for the American Society for Testing and Materials.

42. Defendant's Exhibit 1098.

The value: R, equals the rate of stretch in percent per second; L_2 equals the final length or width of the stretched film; L_1, equals the initial length or width of the film before it was stretched; and t, equals the total time of stretch.

It is unquestioned that Mehta's formula provides the same value for rate of stretch as the formula contained in Gore's Japanese patent. It is equally clear that Mehta's formula is consistent with: (1) the formula for computing the time of stretch as taught in United States Letters Patent No. 3,652,759, (hereinafter, Schlemmer patent);[43] (2) the formula for computing stretch rate derived from definitions contained in the 1970 Annual Book of ASTM Standards; and (3) with the definition of stretch rate used by polymer rheologists before the applications upon which the '566 and '390 patents issued, were filed. Tr., pp. 1876-1877.

Also recited on the '566 patent is a critical minimum rate of stretch:

> The preferred temperature range is from 35°C to 327°C. At the lower temperatures within this range it has been found that there is a maximum rate of expansion beyond which fracture occurs, *as well as a lower limit beneath which fracture also occurs or where weak materials are obtained.* The lower limit is of much more practical significance. At high temperatures within the range, only the lower limit of rate has been detected. The lower limit of expansion rates interact with temperature in

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43. The Schlemmer patent provides the following formula:

$$t_e = \frac{L}{V_2 - V_1} \ln \frac{V_2}{V_1}$$

The value: t_e, equals the time of stretch; L, equals the total length of that free portion of the sheeting [film] which is subjected to drawing, as measured in the machine direction; V_1, equals the feed-in speed of the sheeting; and V_2 equals the take-off speed of the sheeting. Col. 2, lines 33-44.

> a roughly logarithmic fashion, being much higher at higher temperatures.

Col. 2, lines 15-25. (Emphasis added). On direct examination, Dr. Sperati testified that "[t]he lower limit . . . may have to be considerably higher than 10 percent a second in order to achieve the expansion by stretching." Tr. pp. 677-678. He testified further that "one [could be stretching] . . . below the lower limit where the expansion by stretching occurs and . . . get a fracture . . . no expansion or . . . weak products." Tr., p. 678. On cross-examination, however, Dr. Sperati was unable to explain whether the "lower limit" of stretch rate was 10% per second at the lowest temperature within the range recited in the '566 patent. When asked, ". . . at the lower temperature of 35 degrees Centigrade is the lower limit 10 percent per second?", Dr. Sperati responded, "[R]ight now, I don't know." Tr., p. 932. After that answer he was asked, "[w]ell, Dr. Sperati, if you don't know, how can anybody skilled in the art know?", to which he responded, "[t]hat would be correct." *Id.* Dr. Sperati testified further that the '566 patent teaches that the lower limit increases as the temperature increases but that "the data do no support that." Tr., p. 941. When asked, ". . . are the data inconsistent with the statement that 'The lower limit of expansion rates interact with temperature in a roughly logarithmic fashion being much higher at higher temperatures'?", Dr. Sperati, directing his answer to the court, responded:

> I have confused myself. Sir, there are points of my testimony I'm not really sure if I was correct in my statements or not as I sit here at this moment. I'm attempting to collect my thoughts.

Tr., p. 941. Finally, when the same question was repeated, Dr. Sperati responded, "I don't know." Tr., p. 942. Next, Dr. Sperati testified as follows:

Q. Now, my question to you, Dr. Sperati, is this:

I have a stretching operation in which I stretch at some temperature below the melt point, the crystalline melt point, 250 degrees Centigrade, and I am stretching at a rate exceeding 10 percent per second as computed by your equation; but I am below the lower limit.

How do I know whether I am within the scope of the patent or not within the scope of the patent?

A. Whether or not you are obtaining expansion by stretching.

Q. *In other words, if it works, I am infringing, and if it doesn't work, I am not infringing; is that your answer, Dr. Sperati?*

A. *That is correct.*

Tr., pp. 946-947. (Emphasis added). The court is persuaded by Garlock's contention that "[t]he Sperati testimony conclusively establishes that the '566 and '390 patents are vague and ambiguous in their failure to teach one skilled in the art what the critical lower limit of stretching is at elevated temperatures above 35°C., such as used by Garlock in its various PTFE stretching operations." Garlock's Post Trial Brief, P. 68. Although the '566 patent recites a lower limit of stretch rate increases as temperature increases and Dr. Sperati testified that "[t]he lower limit . . . may have to be considerably higher than 10 percent per second in order to achieve . . . expansion by stretching," Tr., p. 678, neither the '566 nor the '390 patents contain an express disclosure of what the lower limit of stretch rate is a temperatures above 35 degrees C. Therefore, they do not teach one skilled in the art to distinguish processes (and the products which result from their use) performed above the "lower limit," from those which are performed below the "lower limit" but at a rate of stretch above 10% per second. In other words the '566 and '390 patents leave one skilled in the art to his own trial and error.

The court finds further that the term "matrix tensile strength" is indefinite. The term is neither recognized nor defined by the ASTM. Tr., pp. 804 and 1779. It is not defined by either the '566 or the '390 patents. Both patents however, recite the following:

> to compute matrix tensile strength of a porous specimen, one divides the maximum force required to break the sample by the cross sectional area of the porous sample, and then multiplies this quantity *by the ratio of the specific gravity of the solid polymer* divided by the specific gravity of the porous specimen. Equivalently, the matrix tensile strength is obtained by multiplying the tensile strength computed according to the above definition *by the ratio of the specific gravities of the solid polymer* to the porous product. In the examples which follow, both tensile strength and matrix tensile strength are shown, computed according to the above method, the lowest matrix strength measured being about 7300 p.s.i. In other words, the products shown herein all have matrix strengths of above about 7300 p.s.i.

'566 patent, Col. 3, lines 33-48; '390 patent, Col. 3, lines 36-51. (Emphasis added). The term "specific gravity of the solid polymer," however is not defined in either of the patents. Since PTFE exhibits different values of specific gravity depending on whether it is heated to a temperature above its crystalline melt point, the term "matrix tensile strength" has no ascertainable definition.

Premised on these facts, the court holds that the inventions claimed in the '566 and '390 patents are indefinite under 35 U,S.C. §112.

Garlock claims that the '566 and '390 patents are invalid and unenforceable because Gore committed fraud before the patent office. The thrust of Garlock's claim is that Gore: (1) withheld Russian Author's Certificate 240,997 from the patent office during the prosecu-

tion of the '566 patent; (2) submitted "paper" examples to the patent office which were written in past tense; (3) fabricated examples; (4) asserted falsely that if PTFE articles are stretched at a rate that is always in excess of 10% per second, the product that results always has a matrix tensile strength of at least 7300 p.s.i.; and (5) that Robert W. Gore filed an affidavit in which he stated falsely that prior to October, 1969 Gore had not manufactured thread seal tape commercially by stretching PTFE at a rate in excess of 10% per second.

In *Precision Instrument Mfg. Co. v. Automotive Maintenance Machinery Co.*, 324 U.S. 806, 65 S. Ct. 993 (1945), the United States Supreme Court held that when an applicant for a patent suppresses facts which should be disclosed to the patent office, "the doors of a court of equity" are closed when he seeks to enforce the patent. 324 U.S. at 814, 65 s. Ct. at 997. In *Precision*, "the party seeking to enforce the patent knew that the patent had been acquired by means of perjury regarding the date of invention." *Skil Corp. v. Lucerne Products, Inc.*, 684 F.2d 346, 350 (6th Cir. 1982). In *Skil Corp. v. Lucerne Products, Inc., supra,* the Sixth Circuit Court of Appeals held that "[i]n this Circuit a party asserting a fraud defense in patent litigation is required to prove 'specific intent,' that is, intent to defraud, by clear, unequivocal and convincing evidence." 684 F.2d at 349. *Accord: Kearney & Trecker Corp. v. Cincinnati Milacron Inc.*, 562 F.2d 365, 371 (6th Cir. 1977), "[t]his court made clear in *Kolene Corp. v. Motor City Metal Treating, Inc.*, 440 F.2d 77, 83 (6th Cir.), *cert. denied*, 404 U.S. 886, 92 S. Ct. 203, 30 L.Ed.2d 169 (1971), that mere technical fraud is not sufficient to deny enforceability, but that " 'scienter' or fraudulent intent . . . is an integral part of the defense of fraud." *See also: Schnadig Corp. v. Gaines Mfg. Co., Inc.*, 494 F.2d 383, 392 (6th Cir. 1974), " [f]raud or unclean hands *are not to be lightly inferred.*" (Emphasis added). The court finds that the evidence in this case fails to establish that

Gore had a "specific intent" to defraud the patent office. Accordingly, the court holds Garlock's claim to be without merit.

The final issue before the court is that of attorney's fees. In patent cases, 35 U.S.C. §285 permits an award of attorney's fees to the prevailing party when the circumstances are "exceptional."[44] Such an award "is intended to compensate the prevailing party for costs that it would not have incurred but for the conduct of the losing party and is within the sound discretion of the district court." *Campbell v. Spectrum Automation Co.*, 601 F.2d 246, 251 (6th Cir. 1979). *Accord: Park-Ohio Industries, Inc. v. Letica Corp.*, 617 F.2d 450, 454 (6th Cir. 1980); *Saginaw Products Corp. v. Eastern Airlines, Inc.*, *supra*, 615 F.2d at 1143. "However, an award is proper only where the district court had made specific findings that bring the case within the 'exceptional' definition." *Campbell v. Spectrum Automation Co.*, *supra*, 601 F.2d at 251. The Sixth Circuit Court of Appeals has held that exceptional circumstances "include conduct that is fraudulent, malicious, in bad faith . . . and unfair, inequitable, unconscionable, or similar conduct." *Id.* The court finds no such conduct in this case. Therefore, Garlock's request for attorney's fees is denied.

Accordingly, the court holds United States Letters Patent Nos. 3,953,566 and 4,187,390 invalid under 35 U.S.C. §§102, 103 and 112.

IT IS SO ORDERED.

United States District Judge

44. *See*: F.N. 5, *supra*.